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Persuasive Chatbot Conversations: Towards a Personalized User Experience

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Abstract

Helping drivers improve their driving skills and become safer drivers is a problematic topic. Most drivers have a lacking self-assessment ability and consider themselves above average driving skills. This is believed to be related to the lack of continuous feedback after getting the driver's license. This has led to initiatives to find alternative ways of coaching drivers toward better self-assessment and thereby toward safer driving. Chatbots and conversational interfaces has received increasing attention over the years and could be technologies that can solve these challenges. However, a major challenge to chatbots is that they are mostly implemented in a "one-size-fits-all" approach, and while personalization of the chatbot could solve that challenge, it is hard to achieve. In this study, personalized chatbot conversations that aim to coach drivers are examined. The aim is to create a guide that can help designers and practitioners with design decisions that needs to be considered when creating coaching chatbot conversations. The study was performed as a Wizard of Oz study, where attributes for personalization as well as coaching considerations were tested with users in two iterations to iteratively develop the guide. The findings of the study include the guide itself with its guidelines (see appendix 4), as well as insights on considerations required chatbot personalization and coaching. Regarding personalization, chatbot personality and level of control were identified as two attributes that were fit for adaptation. These can lead to social benefits as well as more tailored services to the users. For coaching, the use of follow-ups, feedback and the chatbot's attitude are identified as necessary considerations when designing coaching chatbot conversations.

Keywords: chatbot, persuasive, human-chatbot conversations, wizard of oz, personalization, coaching, guide.

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1 Introduction and Motivation

The introductory chapter aim to give the reader an overview of the field and the purpose of the thesis. This overview consists of a background, research problem, purpose, research questions and delimitations.

This thesis has been performed in collaboration with Apegroup, a digital design and innovation studio located in Stockholm, Sweden. They had a complex project about creating an automated coaching program designed to coach drivers to become safer on the road. The main focus of the thesis was to investigate persuasive and personalized human-chatbot conversations and to create a guide to support chatbot design.

The need of safer traffic is of great importance and can save lives. In Sweden, 221 people died in traffic-related accidents in 2019 (Transportstyrelsen, 2020). With the goal of vision zero being that no one should be killed or badly injured by traffic (Trafikverket, 2019), there apparently is more to be done to make that death count reach zero. One way to reach drivers and make them practice safe driving could be through human-chatbot coaching. This would enable users to reflect and get easy access to coaching and feedback to improve their skills and self-awareness.

1.1 Background

There was not long ago that most technologies were designed without any thought of incorporating elements to influence the users. The diffusion of computers has generated varying uses for interactive computing, including the use of technology that motivate and influence behavior change. This initiative started to gain interest along with the World Wide Web in the late 1990s, where a few researchers started to look into how systems could be created with the purpose of being useful to human life (Fogg, Cuellar & Danielson, 2009). Nowadays, many interactive systems attempt to achieve desirable changes of users' attitudes and behaviors (Harjumaa, Segerståhl & Oinas-Kukkonen, 2009). These systems are called persuasive systems and is defined by Fogg (1998) as technology that is designed to shape, reinforce or change behavior or attitudes of the users about an issue or action. Harjumaa, Segerståhl and Oinas-Kukkonen (2009) describe that persuasive technology may help achieve desired changes of users' behaviors when having a useful strategy to go for. However, according to Fogg, Cuellar and Danielson (2009) persuasive technology includes two underlying assumptions of the behavior change. First, persuasion is considered noncoercive, meaning that it should not be done by force or in a manipulative manner. Secondly, the behavior change done in persuasion is intended. Persuasive technology does not accidentally change the behavior of its users, it is designed with the intent to change.

Persuasive systems can be used in many domains and settings, such as e-commerce or health systems. A domain that according to Fogg, Cuellar and Danielson (2009) is expected to receive increased attention is safety. This domain includes helping people become better drivers and thereby drive more safely. Williams, Pack and Lund (1995) state that most drivers are lacking

self-awareness of their own driving skills, where they believe themselves to be above average when it comes to both driving skill and safe driving practices. It is believed that others need to improve, while oneself having the proper skills and mindset. Hence, drivers rarely find themselves in need of change. The primary reason of feeling the need to improve one's driving skills is the possibility of negative consequences, where crashes, parking tickets and losing one's license are common motivators of becoming a safer driver. Amado *et al.* (2014) recommend providing feedback of errors and violations for drivers in order to increase insights to their own driving performance. They explain that drivers self-assessment deviates partly due to the fact that no evaluated feedback is present after getting the driving license. Improvement of realistic self-assessments and traffic safety should be offered by driver training program or similar for older and experienced drivers where time has passed since they got their license. Further, it must be noted that feedback needs to be well defined and specific in order to serve its purpose (Kruger & Dunning, 1999). Persuasive systems could get an important role into giving feedback that can aid drivers assess their own ability. It has been shown that access to feedback on ones driving behavior have a positive impact on the driver performance and driving safer in the long-term (Toledo & Lotan, 2006). Persuasive systems could be a game changer to the challenges of drivers lacking ability to self-assess if the system manage to provide feedback that is well defined, specific and customized to each individual driver (Kruger & Dunning, 1999; Toledo & Lotan, 2006).

A system that can be persuasive, and that could address the challenges of drivers' lacking self-assessment are chatbots. Chatbots are a growing market with big advancements over the recent years. It is projected that the size of the chatbot market will grow with 29.7% during the forecast period (Market Insider, 2019). Chatbots and natural-language interfaces has the possibility to support conversational processes and at the same time providing useful output. This is seen as a key success factor together with benefits such as ease of use, speed and convenience (Brandtzaeg & Følstad, 2017a, 2017b). Hill, Randolph Ford and Farreras (2015) found that many people are receptive to interact with chatbots if the systems are offering enough to capture the interest of its users. Even though users have less experience with chatbot conversations than with humans, people in Hill, Randolph Ford and Farreras (2015) test communicated for longer durations with the chatbot. One reason why users' feel satisfied when interacting with computers could be linked to the choice of personality of the computer. Nass *et al.* (1995) found that people tend to like the interaction to a greater extent if the computer have a similar personality to the users. Also, Ghandeharioun *et al.* (2019) express that chatbots with emotional intelligence and personality were necessary factors for behavior change systems. They experienced that chatbots with these attributes had a positive effect for the users interacting with them. Thereby, it is necessary to set the purpose and key characteristics for the chatbot in order to create an interaction that is appreciated by its users. Creating personalized interactions with chatbots is important but challenging, given that they often are implemented with a "one-size-fits-all" approach (Brandtzaeg & Følstad, 2017b).

1.2 Research Problem

Chatbots and conversational interfaces are technologies that has received increasing attention over the past years. Brandtzaeg and Følstad (2017a) express these chatbots as technology that will conquer the market, which is aligned with Market Insider (2019) forecast. The interest has thereby also increased from researchers but only a small fraction of the current body of research has focused on chatbots that can coach and persuade its users. Examples of research that has had persuasion or coaching in mind is Skjuve and Brandzaeg (2019) and Ghandeharioun *et al.* (2019). However, neither persuasion nor coaching were at the center of attention in these articles. Mainly, articles about chatbots highlight other topics than persuasion and coaching. Examples of topics are motivation to use chatbots (Brandtzaeg & Følstad, 2017b), interpersonal communicational competence of chatbots (Skjuve & Brandtzaeg, 2019) and how chatbots change how humans interact with technology (Brandtzaeg & Følstad, 2018). This suggest that there is a research gap regarding chatbots that are used to coach and persuade its users. This gap is also expressed by Brandtzaeg and Følstad (2017a) that claim the need for further focus on human-chatbot interaction. Further, safety and driving are contexts within persuasive systems that has not had much attention and is currently in need of further research. Combined with the challenges of drivers and their lacking self-awareness expressed by Williams, Pack and Lund (1995) we can see a need of further research both from a theoretical and practical perspective.

Regarding the users' experiences of chatbots, Brandtzaeg and Følstad (2017a) express that chatbots are rarely setup in a way that makes each interaction personalized. Most of the time they are implemented in a "one-size-fits-all" approach. Likewise, Chaves and Gerosa (2019) express that dissatisfaction with chatbots is often related to them being generic. They also express multiple benefits with personalized chatbots, but state that it is challenging to achieve. In relation to personalization, Ghandeharioun *et al.* (2019) state that it is important for chatbots to have a personality and an emotional understanding to enhance the users' experiences. Skjuve and Brandzaeg (2019) discuss communicational competences the chatbots need to have for a positive user experience, however there is a research gap when it comes to actual design guidelines beyond technical aspects.

To summarize the research problem there is an obvious research gap both in terms of chatbots with the purpose of coaching and persuasion, and in terms of how to design chatbots for a personalized user experience. This gap is even more significant in the context of driving and safety. From a practical point of view, chatbots has received an increased attention from the market over the years which also highlight the importance of further research.

1.3 Purpose and Research Question

The purpose of this study is to investigate how personalized conversations between humans and a chatbot with a persuasive goal can be designed in the context of driving and safety. As part of this, the goal is to compile guidelines on how persuasive and coaching conversations between humans and chatbots can be personalized and designed. The knowledge contribution will thereby be a guide to help researchers and practitioners in the design of personalized persuasive

chatbots, as well as learnings from the design of actual conversations for a chatbot with a persuasive goal of safer driving.

The research questions are the following:

- *How can chatbot conversations be designed that has a persuasive goal of safer driving?*
    - *What guidelines can help in the design of persuasive and personalized human-chatbot conversations?*
    - *What attributes of the chatbot can be adapted towards individual users to achieve a personalized user experience?*
    - *What considerations should be assessed for persuasive chatbot conversations to motivate and encourage the users?*

1.4 Delimitations and Clarifications

It needs to be clarified that this thesis has a focus on the design and content of the chatbot conversations. This mean that this thesis does not take a technical approach to actually creating an operational chatbot. Instead, it focuses on creating a guide for personalized human-chatbot conversations and specifically, designing conversations for a chatbot in the given context with drivers. Further, the goal of persuasive systems is to change the behavior of its users. However, the thesis does not aim at measuring the success of the created chatbot's persuasion since the focus is on identifying guidelines.

2 Theoretical Framework

The theoretical framework consists of the research that has been necessary to provide a scientific foundation to the study. The chapter begins with terminology followed by personalization, coaching and feedback, drivers, non-verbal components in human-human conversation, human-chatbot conversation and Myers-Briggs type indicator.

2.1 Terminology

This section assesses definitions that are central to the thesis. The definitions that are stated are *"chatbots"*, *"persuasive systems"* and "*persuasive chatbots"*.

2.1.1 Chatbot

Even though the concept of chatbots is rather known and unified from a practical perspective, there are multiple ways to define it in theory. Definitions that multiple researchers use (Brandtzaeg & Følstad, 2017b, 2017a; Chaves & Gerosa, 2019; Skjuve & Brandtzaeg, 2019), state chatbots to be machine agents that use a natural language as a user interface to data and services. A more detailed definition is made by Müller *et al.* (2019), which also will be used for this study:

> *"Chatbots, also known as virtual agents, digital assistants, or conversational agents, are defined as tools that allow us to pursue a certain goal through a natural language dialogue with a machine, either text-based or voice-based." (Müller et al., 2019)*

Firstly, the definition by Müller *et al.* (2019) states synonyms to the terms, which in this study also will be treated as the same phenomenon. Secondly, the definition indicates that chatbots can be either text-based or voice-based. When this study refers to chatbots, it will be of text-based chatbots.

Further, Skjuve and Brandzaeg (2019) describe that chatbots comes in different forms, either with short-term or long-term engagement and with user-driven or chatbot-driven dialogues. Specifically, chatbots for coaching often have a chatbot-centered approach and long-term duration of relation. The researchers express that this is because the chatbot needs to make sure that the user stepwise goes through some sort of program that increasingly help the user to master a specific challenge or learn a desirable skill.

2.1.2 Persuasive systems and persuasive chatbots

The definition of persuasive systems has already been mentioned in the introductory chapter of this thesis. However, it is repeated to bring clearance. Persuasion as itself is defined by Fogg (1998) as *"an attempt to shape, reinforce, or change behaviors, feelings, or thoughts about an issue, object, or action"*. The definition needs to include two underlying assumptions of behavior change. Firstly, Fogg (1998), and Fogg, Cuellar and Danielson (2009) state that persuasion implies that there is an intent to change attitudes or behavior. Thereby accidentally

changing behavior will not be considered persuasion. Secondly, Fogg, Cuellar and Danielson (2009) express that persuasion should not be done by force or by manipulation.

When persuasion is further specified into a persuasive system, Fogg (1998) include the term *interactive technology.* However, that term is too broad to be used in this thesis where chatbots are the primary technology that is being focused on. Thereby persuasion is combined specifically into a *persuasive chatbot*, which is defined as a chatbot that intentionally attempt to change the behavior of its users, without the use of force or manipulation. A term that might be intertwined in the following sections of the thesis is a *coaching chatbot.* Since coaching has the main aim of making the user change, these two terms will be treated as synonyms.

2.2 Personalization

Personalization is a topic that is central to the study, which becomes apparent from the thesis' introductory chapter. Thereby, this section includes definitions, dimensions for personalization, types of personalization as well as benefits and challenges for chatbot personalization.

Personalization is according to Fan and Poole (2006) a topic with multiple different interpretations by different people and different fields. The generic definition they used, and that this study will use, is as follows:

> *"…a process that changes the functionality, interface, information access and content, or distinctiveness of a system to increase its personal relevance to an individual or a category of individuals*." *(Fan & Poole, 2006, p. 183)*

Chaves and Gerosa (2019) is also using the same definition but make an additional distinction between personalization and personality, which often are intertwined. The difference is that personalization focuses on the ability to adapt interface, content and behavior to individuals' preferences and needs, rather than personality traits. Chatbot personality itself is treated in this chapter in section 2.6.3.

Further, Fan and Poole (2006) describe that personalization implementations needs to consider three dimensions; (1) the part of a system that provides personalization by adaptation (what is personalized), (2) the personalization's target (to whom to personalize), and (3) who does the personalization. Regarding the first dimension, there are four aspects of information systems that could be personalized; the content, the user interface, the way to access the information and functionality that is available for the users. These are all considered basic elements that Fan and Poole (2006) claim to be fit for adapting. For the second dimension, the target of personalization, there are two types of targets. The personalization can be targeted individually, and thereby target every individual user and adapt toward its preferences. Likewise, the personalization can target a category of users given the assumption that a user that identifies with the category will likely perceive the system as personalized if it is personalized for the category. The last dimension, who does the personalization, is about automation and is often determined whether the system itself is supposed to personalize or if there are manual actions involved.

2.2.1 Different types of personalization

Fan and Poole (2006) has categorized personalization into four types, each having a different motive and goal. The first is architectural personalization, which has the motive to fulfill the user's need for expressing oneself in design and where the goal is to make the interactive interface adaptable toward personal style. The second type is relational personalization, where the motive is to fulfill the user's need of social belonging and thereby strive toward the goal of creating a platform for social interaction. The third type is instrumental personalization and has the motive to fulfill the user's need for efficiency and productivity. The goal is thereby to increase how the system can be used to increase efficiency and productivity. The last type that the researchers mention is the commercial personalization, where the motive is to fulfill the user's material need and welfare. The goal here is related to commerce and is both to increase sales and to enhance the customer's loyalty.

2.2.2 Benefits of chatbot personalization

Personalization can according to Chaves and Gerosa (2019) be implemented for chatbots to increase the chatbot's social intelligence, where the chatbot becomes aware of situational contents and also may adapt toward features that better suit individual needs. Here, social intelligence refers to the ability to produce an adequate social behavior for the current goal. The researchers also indicate that personalization is related to the engagement of chatbots.

The first benefit Chaves and Gerosa (2019) treat is that personalization is considered to enrich interpersonal relationships if the chatbot gets access to personal information since it may use the information to create affection and a sense of social belonging. This is related to the perceived trust and authenticity of the chatbot. The second benefit they treat is how personalization contribute to better and unique services. Information that is personalized will be more useful to the user, and thereby increase the value of the service. Likewise, when a chatbot use generic services, user dissatisfaction is common. The third and last benefit that Chaves and Gerosa (2019) state is that the interactional interface and how the user inputs information can be adapted based on what the users' prefer.

2.2.3 The challenge of chatbot personalization

For personalized chatbots, the main challenge identified by Chaves and Gerosa (2019) is privacy. Personalized chatbots are dependent on memory of previous interactions as well as data about user preferences and personal information to achieve expected benefits. There is no clear view on how this should be handled, rather different proposals are stated to decrease the risk of privacy becoming an issue. Firstly, the chatbot is expected to be transparent about its purpose, ethical standards and how it uses data. Secondly, an idea is to find a way to let the users inform the chatbot that a part of the conversation should be treated as private information. Lastly, the use of social media information and similar is considered a bad idea since that kind of information often is considered sensitive.

2.3 Coaching and Feedback

Coaching is a central part since the purpose of the chatbot that will be tested in the study, is to coach. Thereby, research about coaching and feedback is relevant to include.

Inoue, Kitamura, Sato et al. (2015) discuss the coaching technique and makes a difference between coaching and traditional training. Coaching is usually given to support people that already has a goal they want to achieve while traditional training does not expect that the person improves by himself. A person that gets coaching has knowledge and skills beforehand, but traditional training needs to teach the learner so he or she gets the needed knowledge and understands why and what something should be done. The learner for traditional training is in that sense more dependent than those who gets coaching. Similarly, Champathes (2006) compares coaching to teaching and state that these two are fundamentally different. Teaching is normally a one-way communication, while coaching is a two-way communication process that is iterative where the learner produces and deliver some results and the coach then give feedback on the result so the learner can adjust. The process goes on until expected outcomes are reached. The main role of the coach is to help the learner diagnose what is going on, what can be improved and how to improve. Thereby the process is tightly dependent on accurate feedback, which is also expressed by Steelman and Wolfeld (2018) who claims that feedback plays an important role to engage and encourage.

O'Broin and Palmer (2010) studied the relationship between the coach and the learner. They claim that the relationship is important, and that bonding, and engagement is not only happening in the beginning of the coaching, rather it is an ongoing process. They also state that the coach needs to adapt the coaching to each individual learner, since all learners will be different. Likewise, Achterkamp *et al.* (2018) explain that feedback needs to be tailored and adapted to the learners for increased effectiveness and greater impact. In relation to coaching, Champathes (2006) states that it is important that the needs of coaching is made clear and that objectives are set that are measurable, if possible.

2.4 Drivers

In this section, research about drivers and their lack of self-assessment is assessed. This is central due to the fact that the study focuses on coaching drivers with the use of chatbots.

Most drivers consider themselves above average in terms of driving skills, which is demonstrated by Williams, Pack and Lund (1995) where 72% of the drivers in their study believed themselves to be above average. Meanwhile, Amado *et al.* (2014) state that drivers with more experience of driving has worse self-awareness compared to less experienced drivers. They indicate the need for feedback to make the drivers develop self-assessment skills. The feedback has to be specific for the driver and well-defined to be assessed by the driver (Amado *et al.*, 2014). This is also stated by Toledo and Lotan (2006) who saw a correlation between access to feedback and driver performance. They claimed that higher levels of feedback lead to lower driver risk and thereby safer driving. Combined with the lacking self-awareness, they consider follow-up as an important part in sustaining the positive effects of feedback over time. If follow-up is not present, the drivers lack the motivation to improve. A different view on improving driving skills is made by Williams, Pack and Lund (1995), who state that drivers are unlikely to improve only with appeals. They state that the possibility of negative consequences is the major motivator for drivers to improve their skills. These possible

consequences need to be concrete, where crashes, tickets or losing one's license are considered impactful examples.

2.5 Non-Verbal Components in Human-Human Conversation

Humans do not only communicate verbally with words. In fact, there are great number of ways humans communicate without the use of words. This section aims to get an overview of these non-verbal communicative aspects to learn from in the creation of design guidelines.

Body language is according to Hans and Hans (2015) communication through movements including gestures, head movements, facial expressions and eye contact. The use of gestures comes in various forms but often to support the verbal message, so called gestures that flows naturally. These types of gestures come as we speak subconsciously in different levels of intensity and frequency depending on the context and do not necessarily have a meaning on their own. An example of a gesture like this could be hand gestures that indicates the size or shape of an object. Another gesture of subconscious character is gestures that is targeted toward the self, objects or others that we not really are in control of. These gestures are not a part of a conversation per say but instead indicate internal states such as stress or anxiety by twirling hair or clicking pens. A type of gesture that are conscious and comes with a specific meaning are the ones that either have cultural meaning or agreed-on meaning. One example of this gesture is communicating "OK" with the thumb up without the need of any words (Hans & Hans, 2015). This gesture also includes head movements, where another example is the meaning of nodding your head from side to side, which mean no in most countries but in some countries it actually means yes.

Facial expressions and eye contact have an important role in body language when it comes to interpersonal communication. The facial expressions that humans make, clearly communicates our emotions, where happiness, sadness, fear, anger and disgust are universally recognized as the core facial expressions. The emotions play a central role in conversations since it enhances how the message is expressed and perceived. Furthermore, the communication through eye contact indicate people's attention and interest in the conversation. The communicative functions of eye contact ranging from conveying facts and information, to regulating, monitoring and interpret the interaction, but also to establishing interpersonal connections (Hans & Hans, 2015).

Further, another type of non-verbal communication used in interpersonal communication is according to Laplante and Ambady (2003) tone of voice and voice intensity. They made a study that compared which affect to politeness tone of voice and voice intensity had in relation to the communicated statement or question. They found that tone of voice and voice intensity had a positive impact on statements with positive content and on both positive and negative questions. Thereby the only content not being affected of tone of voice were the negative statements. The researchers underscore that these non-verbal cues can be important when communicating, but also state that it has a limited role since it cannot compensate if the statement at hand is negative.

The sense of touch is an essential part of human social development. Hans and Hans (2015) describe that touch has the power to effectively communicate messages that words alone cannot. With touch involved humans can communicate unique messages such as caring, concern, comfort that words alone cannot. Also, Hertenstein *et al.* (2006) express that the human touch can be used to communicate at least six different distinct emotions: anger, fear, disgust, love, gratitude, and sympathy. Thereby it is shown that touch can be an important factor in interpersonal communication in multiple ways.

2.6 Human-Chatbot Conversation

In this section, an overview is made around considerations needed when designing a chatbot to communicate with humans. This topic is relevant since it can be related and compared to the non-verbal components of human-human conversation as mentioned in previous chapter.

Gnewuch *et al.* (2018) argues that a conversation between chatbot and human is not just about content, rather it is of importance to consider the non-verbal elements. Without non-verbal elements, interactions with the chatbot will not be perceived as natural by its users.

2.6.1 Trust and transparency

Trust is according to Følstad, Nordheim and Bjørkli (2018) not only a matter of the chatbot, rather the designer need to handle trust in the service context as a whole. This can be both beneficial and harming dependent on the situation. With a trusted service provider, the chatbot automatically will receive trust from its users, but on the other side a service provider without trust will make it hard for the chatbot to build trust itself. In their study, Følstad, Nordheim and Bjørkli (2018) analyzed chatbots in the context of customer service where chatbots were used for self-service. A service provider thereby references the actor that provides the service where the chatbot will be used. Further, when looking into the practical guidelines to chatbot creation by Microsoft (2018) an important step of the design process is to handle ethical aspects and being transparent about the chatbot. This includes stating the purpose of the chatbot and how it will benefit its users as an early stage of the design. Also, as a matter of transparency the chatbot need to inform its users clearly that it in fact is a chatbot and not a human, which is not always being made clear enough.

2.6.2 Social cues

When designing chatbots Gnewuch *et al.* (2018) state an importance of paying attention to details that can make the conversations feel more natural and human-like. Specifically, social cues are design features that can be used to achieve this and aim at incorporating human attributes to the chatbot. However, the designer needs to take caution for human likeness to avoid creating unrealistic expectations or misunderstandings that are out of reach of the chatbot's capabilities. There is also a risk that technology that closely resemble human beings might be unsettling to humans, thereby finding a balance is key. Further, Feine *et al.* (2019) has organized social cues for text-based conversational agents into three categories; *Verbal*, *Visual* and *Invisible*. There is also a fourth category for conversational agents in general, *Auditory,* but it does not apply to text-based conversational agents since it is about voice and sound.

Each of the three categories has corresponding subcategories and is described according to Feine *et al.* (2019). Firstly, *verbal social cues* are the cues created by words; what people say or write. This includes two subcategories, *Content* (what is said) and *Style* (how something is said). Examples of *Content cues* are greetings, farewells, referrals to the past, jokes and small talk, while examples of *Style cues* are level of formality, sentence complexity and language used. Secondly, *visual social cues* are non-verbal social cues that are visually perceptible by the user. There are two subcategories, *Appearance* (name of the chatbot, facial features of chatbot avatar, level of realism of avatar) and *Computer-mediated communication* (typeface – referring to the design of letters and symbols used by the chatbot). The *appearance* of the chatbot was in particular considered important according to Araujo (2018) since it increased the level the users perceived the chatbot as human-like. Lastly, *invisible social cues* consist of only one aspect, namely *Response time,* and consists of the use of response time to create a natural flow of the conversation.

Jibril and Abdullah (2013) makes a deep-dive into the use of emoticons during computer-mediated communication and makes it clear that emoticons have evolved to become a natural part of any computer-mediated communication. They state that emoticons are not only compensatory to language, rather it contributes to conversation itself. It fills the gap of not being face-to-face when conversating over conversational agents and is in the context of computer-mediated communication considered as a socio-emotional supplier.

Regarding *invisible social cues,* Gnewuch *et al.* (2018) state the importance of using a dynamic response delay which has a positive effect on the users experience of chatbots. Chatbots that incorporated a natural dynamic response delay were perceived as more human-like and more socially present and made the users more pleased with its interaction. While not only creating a human-like experience, the dynamic response delay also elicits social responses from the users. The researchers thereby recommend involving this characteristic when designing chatbots.

Similar to the categorization above by Feine *et al.* (2019), Toader *et al.* (2019) express a social cue not currently treated in the categorization which is the gender of the chatbot. They found a significant correlation between gender and the users' willingness to disclose personal information and their attitude towards the chatbot, where portraying the chatbot as a female had a positive impact. In the categorization above gender would fall into the category of *visual social cues* since it would affect how the chatbot is visually expressed.

2.6.3 Chatbot personality

Personality is a considered important factor in designing chatbots (Aly & Tapus, 2016; Smestad & Volden, 2019; Yorita *et al.*, 2019). However, personalization does not come without challenges and Yorita *et al.* (2019) state that majority of research has focused on *Big-Five personality model* and has also primarily focused on only one of the five personality attributes, namely being extroverted or introverted. Regarding extroversion, both Aly and Tapus (2016), and Yorita *et al.* (2019) has found correlations between the personality of the chatbot and the user, where the users preferred if the chatbot's behavior and personality was adapted to the

human's personality when interacting. Thereby, extroverted humans preferred extroverted chatbots and introverted humans preferred introverted chatbots. Smestad and Volden (2019) express personalities for chatbots as something complicated in relation to previous articles. Here, the key learning is that personality have a significant positive impact on chatbots, but is dependent on context, the job of the chatbot and its user groups. Smestad and Volden (2019) also incorporates all five personalities of the Big-Five personality model. According to Yorita *et al.* (2019) it is not about choosing specifically the Big-Five personality model, rather it is to incorporate personality in a general sense. Yorita *et al.* (2019) state that there are other models available and also express that researchers rarely have a reason for continuously choosing the Big-Five personality model.

2.7 Myers-Briggs Type Indicator (MBTI)

The Myers-Briggs Type Indicator is used in the method of the thesis and becomes thereby relevant to treat in this chapter.

According to Boyle (1995), MBTI is a personality inventory that has gained popularity among researchers and in society during the years. In MBTI there are in total 16 different personality types, all consisting of a four-letter code that define an individual's characteristics on each of the four dimensions that the model is based on. An important note is that each dimension is not binary, rather each individual has different amount of preference towards one of the alternatives in each dimension. The following list describe the four dimensions:

- *Extroversion/Introversion (E/I)* – the attitude one has toward the world. Extroverts are oriented outward to other persons and objects, while introverts are internally oriented (Boyle, 1995). A similar view is from where individuals get energy, where extroverts get it from the outside world of people and introverts from their own thoughts and ideas (Varvel *et al.*, 2004).
- *Sensing/Intuition (S/N)* – one's perceptual style where sensing is viewed attending sensory stimuli with focus on the real world and intuition is more detached with insightful analysis of stimuli and events (Boyle, 1995). Alike, Varvel *et al.* (2004) state that the dimension is regarding the perception of detail of one's surroundings where sensing prefer detail and intuition prefer an overall picture of the world.
- *Thinking/Feeling (T/F)* – how people make decisions. Here, the thinking individuals turn to logic and facts while feeling individuals turn to their feelings or impact on other people (Varvel *et al.*, 2004).
- *Judging/Perception* – one's way of organizing. Individuals that lean toward a judging preference are organized, planned and punctual, while perceiving individuals are spontaneous, adaptable and open minded (Varvel *et al.*, 2004). A similar view is given by Boyle (1995) that explain this dimension as one's thoroughness when making decisions. Judging individuals are expected to make quick decisions with few facts and perceiving individuals are expected to take their time and gather all information when taking decisions.

3 Method

This chapter provides insight into the method of which this study has been performed. First, the type of study is assessed, followed by the choice of platform and, a detailed description of the process itself is presented. Lastly the ethical principles are presented and applied to the study.

This study was performed as a Wizard of Oz (WoZ) study. Bernsen, Dybkjær and Dybkjær (1993) describe WoZ as a simulation of a non-implemented or partially implemented system where participants are unaware that they are interacting with a human instead of a real system. This means that all simulations are made by a human, called *the wizard*, which simulate the input and output as close as possible as the real system would. The designers role is, according to Dow *et al.* (2005), important to the method and could sometimes be quite demanding. The designer needs to balance the demand of performing in the test but also with observing the participant, which requires both perceptual, cognitive and motor skills. Further, Bernsen, Dybkjær and Dybkjær (1993) state that WoZ could be demanding in term of resources and requires time and high commitment. Dow *et al.* (2005) explain that WoZ allows designers to explore and evaluate designs throughout the design process. It helps designers to be open minded and not having incorrect set of assumptions regarding user preferences.

WoZ was considered to fit this study given that personalized chatbots are technically challenging to implement and since the focus of the study was on non-technical aspects. WoZ enabled to test the features and attributes of a persuasive and personalized chatbot even without having to implement it. The tests could be performed with the participants being ignorant of the fact that they were talking to a wizard instead of an actual chatbot. This gave feedback and insights from the participants as if the chatbot would have been implemented. Thereby, the method was considered appropriate and successful.

3.1 The Choice of Platform

Different platform options were considered when preparing for the user tests with chatbot conversations. A set of criteria were used to compare different platforms in order to select a platform that was suitable for the purpose to run WoZ tests. It was three main criteria that needed to be fulfilled in order to be considered suitable. The first criteria were to be able to simulate input and output in a way that made the participants unaware that they were interacting with a human instead of a chatbot. Secondly, the platform needed to be able to regulate the appearance of the pretended chatbot. Further, a criterion was to have the possibility of chatting in different chatrooms and that those could be set to private so that other participants could not see other conversations with the chatbot. Except for these main criteria, it was also seen as a convenience if the platform were familiar by most of the participants and easy to use for newcomers. It was also an advantage if the platform was easy to setup and prepare for the tests.

The platforms that was seen as alternatives was Messenger, Slack and WhatsApp. See table 1 for comparison of the criteria. The alternative that got selected was Slack, given that it could handle all criteria, while also being familiar to the participants and easy to setup. Both Messenger and WhatsApp were excluded mainly due to the fact that they both lacked the ability

to create multiple chatrooms, but also since it was harder to create a convincing chatbot user. All three alternatives could have been used for the tests, but Slack was considered easiest to handle and to use according to the criteria.

Criteria	Messenger	Slack	WhatsApp
Unaware of wizard	Possible with additional account.	Possible with additional account.	Accounts require a phone number.
Regulate chatbot appearance	Possible, but dependent on Facebook.	Possible.	Possible.
Chatrooms	It is possible to create chat groups. However, it was considered hard to structure.	Possible and convenient.	It is possible to create chat groups. However, it was considered hard to structure.
Extra conveniences	Familiar and easy to use.	Quite familiar and easy to use.	Easy to use, but not as familiar in comparison.

Table 1 - Comparison between different chat platforms based on selected criteria.

3.2 The Process

The thesis aims to gain understanding about designing chatbot conversations and therefore the focus was to iteratively study how different attributes of a persuasive chatbot could be incorporated to create a personalized experience. At the core of the thesis, a guide was created and continuously improved; initially from existing research, then followed by insights from the iterative WoZ tests performed. The process was conducted in three steps:

1. Create guide based on theorical framework
2. Iteration One: Conversations with personality focus
3. Iteration Two: Conversations focusing on level of control and referral to past

3.2.1 Initial guide creation

The first step (*Create guide based on theoretical framework*) started with creation of a guide that collects knowledge from research on what needs to be considered for a personalized chatbot conversation. This guide plays three roles in this study; (1) to assist the upcoming two iterations of designing and testing chatbot conversations, (2) to continuously evolve with the result of each iteration as input and (3) to be a deliverable of the thesis to help practitioners and researchers in design of coaching and persuasive chatbot conversations. The initial creation of the guide focused on research about how humans interact with each other and research specifically about interaction between human and chatbots. Within these topics of research, the goal was to find practically applicable guidelines. All the knowledge was gathered and written in detail. Thereafter, the knowledge was synthesized into the initial draft of the guide. Further motivations on how research has been used can be found in chapter 4.1.

3.2.2 Iterations and user tests

After the initial guide had been created, two iterations of chatbot design and WoZ testing was performed. Figure 1 illustrate the complete process used for each iteration. The process is further described in detail.

Figure 1 - Overview of the process performed for each of the two iterations.

Iteration one

In iteration one, conversations were created and tested with the purpose to see what attributes of the chatbot that was preferable from the participants' point of view. *Chatbot personality* was the attribute of focus and its application is described in detail in Chapter 4. Here, the idea was to identify whether or not the participants' preferences differed or not, where a differing preference would indicate the need to adapt the chatbot personality when designing chatbot conversations. After selecting chatbot personality to focus on, the next step of iteration one was to create a scenario for the conversation to be used as a context for this iteration of design and testing. The use of a scenario was considered beneficial to give the participants of the study an opportunity to relate to the conversations performed during the tests. The scenario was based on a stressed driver that was speeding due to a shortage of time for an appointment. In the scenario, the chatbot initiated communication to help the driver to eliminate the speeding behavior (see appendix 5). Afterwards, three conversations were designed, one for each personality type (see appendix 6). During the conversation design, the guide from the initial step of the method was used to assist in the design decisions that were made.

After the design of the conversations was completed, the conversations were tested with WoZ tests. The tests were performed in Slack with individual chatrooms to enable interaction between the participant and the chatbot. The chatbot was created with its own user account followed by a chosen profile picture and name in order to make sure to not reveal that the test leader was behind the chatbots output. The tests were performed with six participants that each has a driver's license. One at a time, each participant got to try all three versions of the conversation. Each conversation was performed in different chatrooms to make a clear distinction between the different versions of the chatbot. This also made it easier for the participants to notice when a conversation ended and when a new conversation began. In order to make the participants focus on the chatbots personality, a manuscript with answers to the chatbot was handed out and used by the participants. In this way, it was not possible for the participants to change the answers and challenge the chatbot from the different variations of the conversation. After the test, the participants were interviewed with the aim to gather reflections and thoughts from their experiences. In the interview, the participants would also be asked to rank which of the three variations of the conversation they preferred the most and the least. The results of the iteration were lastly incorporated into the design guide as a second draft.

Iteration two

Iteration two had the aim to once again design conversations to test the participants' preferences of a set of attributes. The same context was used as in iteration one, where a driver was speeding, but a different underlying scenario was applied (see appendix 7). Two conversations were created (see appendix 8 and 9) and tested where two attributes were incorporated to focus on. Both attributes were inspired by iteration one but did not incorporate personality. The

attributes for this iteration were *referral to past* and *level of control* and is described in detail in chapter 4. The conversations of the second iteration was split into two parts, since one of the attributes, *referral to past*, is about follow up. Thereby, the first part consisted of the guiding and coaching, and aimed at setting a plan on how to improve as a safe driver. The second part was the follow up of the plan set in part one. This part pretends to take place a couple of weeks after part one but both parts were tested during the same session with the participants. This iteration of tests was performed in the same way as described for iteration one with WoZ tests but with the fundamental difference of not giving the participant a manuscript. Instead, the participants were told to answer as they liked, but with the scenario in mind, and to not test the skills of the chatbot. This fundamental difference also led to a freer conversation design in general (see appendix 8 and 9) with the main purpose to give structure and help the wizard during the test. Thereby each interaction and content were not designed in detail. In this test, there were six new participants with driver's licenses and were selected with a greater variation of experience than the participants of iteration one. The participants in this iteration have had their driver's licenses between 6 to 34 years. After the tests, the participants were interviewed in the same way as for iteration one where discussion around the conversations was performed. Once again, the results were used as input to the design guide, which led to another draft of the guide.

3.3 Ethics

There are several ethics codes that researchers are expected to follow in order to conduct research in an ethically correct way. These codes could be seen as rules that attempts to clarify how researchers should ethically act towards participants for the study. There are codes stated how to act before, during and after conducting the research (Vetenskapsrådet, 2017).

For this study, four principles from Vetenskapsrådet (2017) have been taken into consideration to make sure that the participants were informed and felt comfortable with their participation within the study. The first principle is about information which led to informing all participants about the study and their role but also describing the terms of the participation. Further, the next principle requires the participants to confirm their consent to participate in the test. For this study, all information was described in an informed consent document that was sent out to all individuals that showed their interest in participating. The informed consents were collected with the participants signatures which was crucial to be able to run the tests. Additionally, the participants were told that it was optional and up to themselves if they wanted to go through the whole test or discontinue at any time. All collected data from the tests was processed confidentially to maintain the anonymity of the participants. This involves the last two principles that encompasses the requirement of the participants right of being anonymous within the study and that the collected data are only allowed for the purpose of the study. This meant that the collected data was used for this study only and was not shared with others and will not be shared in the future either.

4 Implementation and Decision-making

This chapter states and motivates design decisions made during each step of the method. For the initial guide, the view on relevant research is expressed. For the iterations, motivations and decisions regarding how each attribute would affect the conversations is expressed.

4.1 Create Guide

With the learnings from the research on human-human communication and human-chatbot communication, practical guidelines were derived and expressed in a synthesized guide (see appendix 1). The following section is a motivation to how research was used for the initial version of the guide.

The theory has been used in different ways in the guide, since research about human-chatbot interaction is directly applicable while research about human-human interaction is inspirational. Thereby, research on human-human interaction needs to be assessed in order to apply it within the human-chatbot context. From the research on human-human communication it is obvious that non-verbal cues are important to communication. This includes movements and sense of touch described by Hans and Hans (2015), as well as tone of voice that is described by Laplante and Ambady (2003). All these non-verbal cues are difficult or impossible to recreate in a text-based environment, as for chatbots. This is also confirmed by Feine *et al.* (2019), who organized social cues for chatbots in different categories and subcategories. They state several social cues that are available for auditory chatbots (has a voice) or embodied chatbots (has a physical body). These social cues are aligned with the knowledge about human-human communication, where cues as body movements or tone of voice can be represented. However, for the text-based chatbot these cues are not relevant to incorporate directly, rather, the designer has to wonder what can compensate these cues. An example is the use of emoticons described by Jibril and Abdullah (2013) that are expected to fill the gap of not being face-to-face while conversating. Related to the knowledge on human-human communication, the use of emoticons thereby could compensate for the lack of facial expressions as well as the lack of some gestures such as thumbs-up.

4.2 Iteration One: Conversations with personality focus

This section describes and motivate how personality has been used as the attribute of focus in iteration one. This include selection of a personality model, how the model's dimensions got mapped to actual design decisions and which personalities was used for the tests.

It was found when creating the guide that adaptation toward personality was important to achieve personalized conversations between humans and chatbots. This led to the decision to incorporate MBTI in order to generalize the personality of the chatbot when designing how conversations could adapt to participants' preferences. However, the Big-Five model was also considered in the decision of personality model, but was not chosen in the end. Yorita *et al.* (2019) stated in their review of the current body of knowledge that many researchers blindly chose the Big-Five model in their assessment of personality. They also stated that there was a need for research on chatbots using other models as MBTI, thereby it was chosen. MBTI has

over the years got criticism, and is criticized by Boyle (1995). However, Boyle (1995) also states that MBTI can be used effectively when a brief characterization or prediction of behavior is needed. The model is described in detail in the theory chapter.

To make the dimensions of the model applicable for the design of chatbot conversations, each dimension had to be mapped to actual design decisions. Thereby, a clarification of these decisions is made. In the following list it is stated how each dimension affected the design of the first iteration:

- *Extroversion/Introversion* - the overall verbosity of the chatbot will be adjusted, where extroversion increased the verbosity and introversion focused on expressing short and precise messages.
- *Sensing/Intuition* – the level of detail of messages. Here the Sensing preference is led to a higher level of detail around the topics included in messages expressed by the chatbot while the intuition type included less detail.
- *Thinking/Feeling* – the level of formality of the text and the number of emoticons used to enhance emotions in the messages. The thinking preference used formal sentences and no or little use of emoticons while feeling preference used informal sentences and use of emoticons.
- *Judging/Perception* – this dimension is excluded in the study since it has no clear resemblance toward message content or characteristics of the chatbot. Thereby the upcoming personality types will be represented with a three-letter code instead of a four-letter code that the original model uses.

With above application of the dimensions one might question the difference between how extroversion/introversion and sensing/intuition affect the conversations. To clarify, verbosity is about the amount of text used excessive to the purpose of the message (e.g. small talk and jokes) while level of detail is about how much detail is expressed about the topic the conversation aims to communicate about.

In total, three underlying personality types (combination of MBTI dimensions) have been selected for the design and test of conversations in this iteration (see image 1). The aim was to make contrasting conversations. The first underlying personality type (*pt1*) had a balance between each dimension with the purpose of showing a baseline to compare to the other two

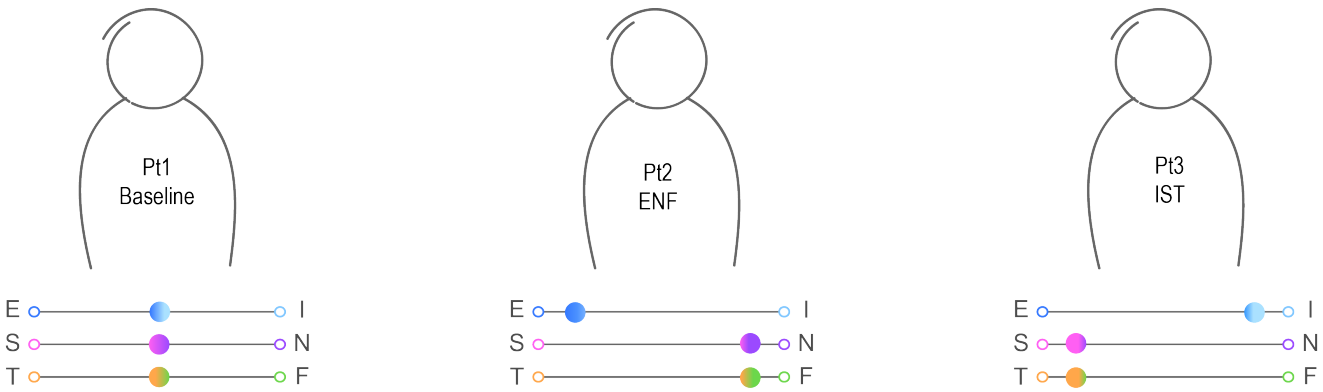


Image 1 - – The three selected personality types used for the user tests in iteration one, based on Myers-Briggs Type Indicator.

personality types. The second underlying personality type (*pt2*) had the personality ENF (Extroverted, Intuitive and Feeling) which assumed its preference toward verbosity, low level of detail, informal sentences and use of emojis. The third underlying personality type (*pt3*) had the personality IST (Introverted, Sensing and Thinking) and thereby was assumed to prefer low level of verbosity, high level of detail, formal sentences, and no use of emojis.

4.3 Iteration Two: Conversations focusing on level of control and referral to past

This section describes and motivates the two attributes of iteration two; why they were used and how they affected the design.

In order to actually achieve a meaningful conversation for a chatbot with a persuasive goal, it could be stated that the communication between the parties needs to consist of a follow-up conversation. The reason being to make sure that the user makes progression and becomes a safer driver in the long run. Insights from iteration one showed that the participants felt a higher motivation if the chatbot actively asked for a follow-up, which in turn also led to the participants experiencing a high level of engagement from the chatbot. Feine *et al.* (2019) also expressed that referral to past interactions between the chatbot and the user is a social cue that should be addressed for chatbot conversations. Thereby it was indicated from both the result of iteration one and by research that aspects that highlight a long-term relation is relevant to create a personalized user experience. The long-term relation comes down to how the chatbot either can indicate a need for further interaction (follow-up) or how it can relate back to the history of previous interactions (referral to past). The follow-up part of the long-term relation has already been tested in the first iteration and was expressed as an engagement driver. Thereby, the second iteration incorporated *referral to past* as the first attribute to investigate and it was focused on the second part of the conversation. It was not about whether or not to refer to the past, rather the focus was to investigate at which level the chatbot should refer to the past.

A major challenge that has been described by Chaves and Gerosa (2019) is privacy, which made it interesting to study if social and personal referrals would trigger privacy concerns. On the other side, a type of personalization described by Fan and Poole (2006) is relational personalization and suggested social belonging as goal of personalization. Thereby, this attribute was be tested with two versions to see the distinction between privacy and social aspects. The first version incorporated referral to the past at a basic level, where the conversation was goal-oriented and thereby only referred to the set goal at the first part of the conversation without any specific details. The second version was more socially active and incorporated referral to the past in the same way as the first version but with more attention to details, while also making referral to personal or social aspects of the first part of the conversation. Thereby the two different levels of referrals were oriented towards whether or not to refer to details and social aspects from step one.

In the first iteration, the chatbot was designed with a controlling approach, where it maneuvered the flow of the conversations and only let the participant answer when invited to answer. This was primarily the cause of how the conversations was planned since chatbot personality was

the attribute of focus. However, it is of relevance to understand which behavior the participants prefer and if it has an impact on the chatbot's ability to coach its users. This leads to the second attribute of iteration two, *level of control.* The attribute affected the conversation at a fundamental level at the first part of the conversation. Level of control was also tested with two contrasting versions. The first version was highly controlling, in the same way it did in iteration one, and lead the participant through the flow of conversation. The second version was open to give the participants the opportunity to lead the flow of conversation. This was done by making it listen more to the inputs of the users and follow the direction of the users. An example is the chatbot's statement "I want to be your sounding board, what do you want to talk about?" which gives the user the control.

As stated previously, both attributes in this iteration used two contrasting variants to indicate user preferences. Since these two attributes focused on two different aspects, they were combined into two versions of the conversation that was tested with participants:

- Version one – low level of control in part one, but with referrals both to plans and social interactions in part two.
- Version two – high level of control in part one, with only basic referrals where no connection to social aspects were incorporated.

From the first iteration, the chatbot personality also had a minor adjustment. While pt1 was expressed as the generally preferred chatbot, it also had some flaws. Primarily it was that participants could experience it as somewhat accusatory. Also, the team spirit of pt2 was seen as a success factor. Thereby, the personality of the chatbot in this iteration was pt1 but with a slight move towards being more encouraging, while embracing the team spirit. Personality was not the focus of the second iteration, but the baseline personality was adjusted in order to improve the overall experience of the chatbot.

5 Results

In this chapter, the results of both iterations performed in the study are stated. The results are structured according to the iterations, starting with iteration one and then followed by iteration two.

5.1 Iteration One

The results from iteration one is treated in this section. First the chatbot preferences are described and then the themes that were identified during the tests are expressed.

5.1.1 Chatbot preference and first impressions

The tests showed that the participants had different preferences when asked which chatbot personality they preferred the most.

Four out of six participants preferred pt1, the baseline personality, with the main reason being an even combination of kindness and seriousness. The first impressions of the chatbot was that it was kind, being normal, having a voice of reason while also being on-topic. Regarding the content, the formulation was described as at the right level of formality and the sentences overall was believed to give a natural flow in the conversations. The level of detail in the statistics was on a level that was understandable. This is how a participant described the chatbot: *"It is a combination of the chatbot being on-topic and giving facts while also having a kind way of talking to me."*.

The use of emoticons was appreciated, while not being overused. Regarding the ability to coach, the participants described how the chatbot made them feel motivated and that the feedback was expressed in a good way. This chatbot was described as emphatic and did not feel accusatory by the majority of the participants, however one participant experienced the tendencies of the opposite. This participant explained how the chatbot to some extent was accusing and that some formulations contained opinions.

Two out of six participants preferred pt2, the ENF-chatbot, the most. The main reason was its kindness and cheerfulness that in turn made the participants feel more motivated when compared to pt1 which was preferred by most participants. The first impressions of the chatbot

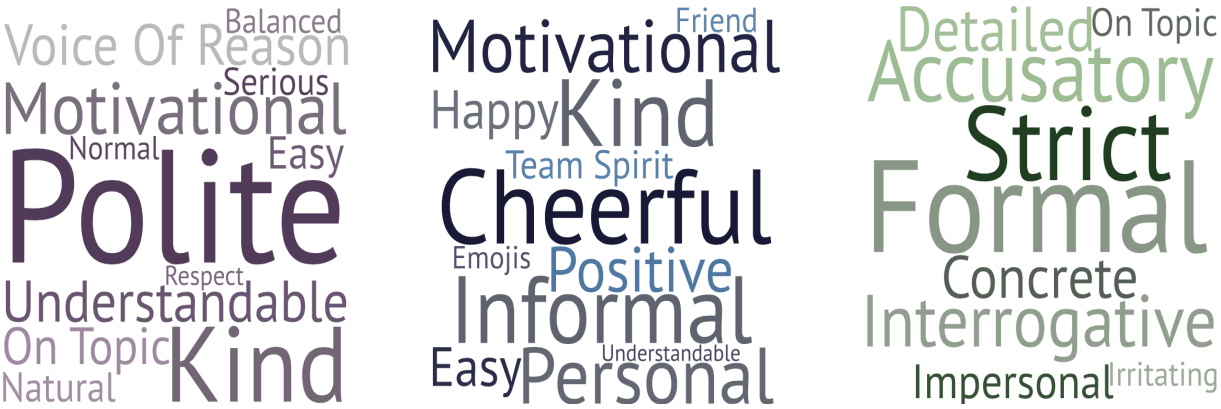


Image 2 - The participants first impressions of each chatbot. Purple represents Pt1, blue represents Pt2 and green represents Pt3.

by the participants was that it was kind, informal, positive, cheerful and that it used lots of emoticons: *"I need someone that is cheering on me and stays positive. The emojis enhanced that even further!".* In terms of formulations, the chatbot was not only described as informal by the two participants preferring the chatbot. They also described that the chatbot's formulations expressed a sense of positivity and happiness, which is the only time emotions got directly related to formulations and content. The coaching ability was primarily why the two participants preferred this chatbot. They described that the chatbot was the only one that had a sense of team spirit and that the chatbot and the participant had the same objectives. As a result, the chatbot was believed to be helpful.

None of the six participants preferred pt3, the IST-chatbot. The first impressions were that it was accusatory, formal, impersonal, strict, interrogative, irritating and unnatural. However, the chatbot was believed to have some positive attributes as well. These consisted of being direct and concrete in its formulations as well as being on-topic.

5.1.2 Chatbot not preferred

Five out of six participants preferred pt3 the least. The main reason was that it lacked the ability to motivate the users while being highly accusatory: *"The chatbot feels accusatory because of the tone it has towards me. It is strict and harsh against me. It feels almost like the chatbot wants me to feel like a fool."*

The level of formality made the chatbot feel auto generated and the high level of detail got heavy for the participants to take in. Further, the participants described the chatbot as authoritarian and patronizing. This got explained as a sense of apprenticeship where the participant was the apprentice and the chatbot was the master. One participant felt the need to stand up for oneself and that the primary objective turned into pleasing the chatbot to make it satisfied rather than focusing on how the participant's behavior could be changed.

One participant preferred pt2 the least and described the reason as it being unprofessional overall. The participant described that it was the number of emoticons and its informality that made it unprofessional. The chatbot was perceived as exaggerated with too much of a "good job" attitude: *"I cannot handle a chatbot that is exaggerating and being too friendly. It feels fake to me."*. In general, the chatbot personality was believed to be in the wrong context and that it lacked seriousness to properly coach about driving safety.

5.1.3 Themes identified from the tests

Reflection

The conversation itself made the participant reflect on their behavior, which was considered impactful. They described that it gave an opportunity to pause and assess their own ability, which normally happens rarely. Making room for this type of reflection was described as an eye opener. All participants stated that this type of chatbot conversation made them think about their own driving abilities and any possible consequences of not driving safely. They stated how they normally are aware of consequences but that it is hard to be reminded of them while driving. With this argumentation, the chatbot could be seen as a reminder to drive carefully.

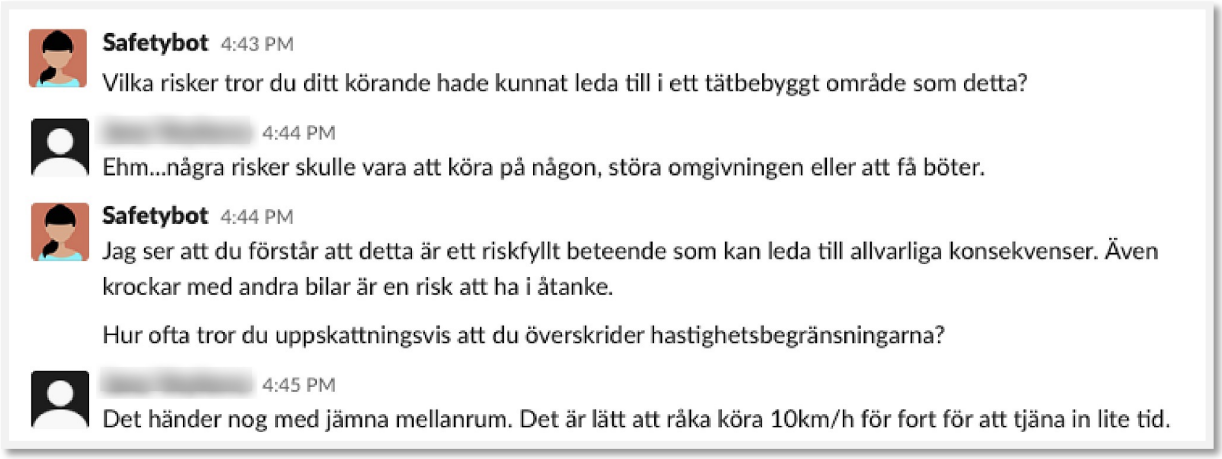

Safetybot 4:43 PM
Vilka risker tror du ditt körande hade kunnat leda till i ett tätbebyggt område som detta?
4:44 PM
Ehm...några risker skulle vara att köra på någon, störa omgivningen eller att få böter.
Safetybot 4:44 PM
Jag ser att du förstår att detta är ett riskfyllt beteende som kan leda till allvarliga konsekvenser. Även krockar med andra bilar är en risk att ha i åtanke.
Hur ofta tror du uppskattningsvis att du överskrider hastighetsbegränsningarna?
4:45 PM
Det händer nog med jämna mellanrum. Det är lätt att råka köra 10km/h för fort för att tjäna in lite tid.

Image 3 - A sequence of the conversation where the chatbot let the user reflect on the risks with speeding and how often the user is speeding (see appendix 10 for translations).

Feedback

The feedback expressed by the chatbot was perceived as a strength of the chatbot. The reason was since the feedback contained concrete tips to think of and advices, while also being informative about consequences and how to improve. A critical success factor was the attitude of the chatbot, and it was believed that it had to be positive in order to not feel accusing. The participants expressed that it was necessary that the feedback was appropriate to the given context to make them use it. Further, the participants felt that the feedback led to a higher motivation to change.

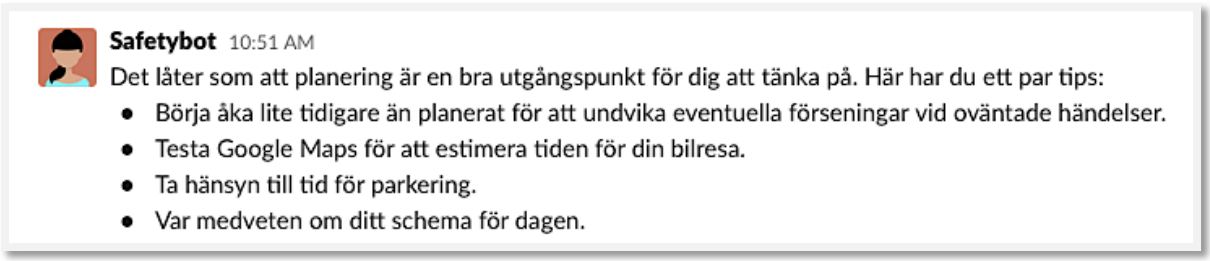

Safetybot 10:51 AM
Det låter som att planering är en bra utgångspunkt för dig att tänka på. Här har du ett par tips:
Börja åka lite tidigare än planerat för att undvika eventuella förseningar vid oväntade händelser.
Testa Google Maps för att estimera tiden för din bilresa.
Ta hänsyn till tid för parkering.
Var medveten om ditt schema för dagen.

Image 4 - One example where the chatbot gives concrete tips to the user (see appendix 10 for translations).

Follow-up and engagement

The conversations were perceived as with greater meaning when leading to a follow-up. This is considered to be related to accountability where the chatbot makes the users motivated to act when it informs that another conversation will take place in two weeks to follow-up the plan. Follow-up was also related to the engagement of the chatbot where participants expressed how the bot want to help when it cares enough to follow up on progress from actions decided upon during the conversation. Likewise, the chatbot openly invite the participants to further dialogue at any time, which made the participants perceive it as engaging.

Safetybot 11:10 AM
Jag tycker att vi bestämmer att du ska tänka på att planera dina bilresor bättre! Vi skulle kunna testa att du aktivt försöker bättra dig under de kommande två veckorna och sedan utvärderar vi hur det har gått. Låter det som en bra ide?
11:10 AM
Jag testar det!
Safetybot 11:11 AM
Då säger vi så! Tänk på att jag alltid finns här om du har funderingar eller behöver mer råd.
Förresten, glöm inte att köra försiktigt! Vi hörs snart igen Hej då

Image 5 - A sequence in the conversation where the chatbot express the desire to make a follow-up. The chatbot ends the conversation by explaining its availability and that the user is free to contact it for further dialog (see appendix 10 for translations).

Motivation and encouragement

Overall the motivation of participants and the chatbot's ability to encourage was considered to be related. The chatbot was perceived as more encouraging and motivational when smileys were used and when it had a positive attitude. The positive attitude was primarily considered important in the initiation and ending of the conversation to make the participant's stay motivated even after the conversation. Cheering is something that contribute to the positive attitude. However, it is also apparent that it needs to be at the right level to keep it serious.

5.1.4 Changes to the design guide after iteration one

The design guide got changed in two ways with the results of this iteration (see appendix 2). Firstly, the findings on personality got included into the already existing part of personalization in the guide. This iteration confirmed the need to adapt chatbot personality based on its users and also generated guidelines on what personality could be used as baseline if a one-size-fits-all needed to be applied, even though it is not recommended. Secondly, a new part was added, Coaching, which led the guide towards its intended purpose to provide guidelines when designing chatbot conversations to coach its users. This part included the findings directly related to the chatbot's ability to coach its users.

5.1.5 Summary of results from Iteration one

The chatbot pt1 was preferred by the majority of the participants due to its combination of kindness and seriousness. Pt2 was preferred by two participants due to its ability to be positive, cheerful, and encouraging. Five out of six participants preferred pt3 the least since it felt accusatory. One participant preferred pt2 the least due to its "good job" attitude, which made it feel unprofessional. Four themes were identified in addition to the preferences above. These were (1) reflection, (2) feedback, (3) follow-up and engagement, and (4) motivation and encouragement. These themes were considered important for coaching chatbots to make the user motivated and willing to improve.

5.2 Iteration Two

This section contains the results generated by iteration two. The results regarding the two attributes are treated initially, followed by the themes identified during the tests.

5.2.1 The chatbot's level of control

From the tests of this iteration, it was shown that five out of six participants preferred the second version of the chatbot, which had a high level of control. This chatbot led the flow of conversation, but still did not feel too controlling since the participants believed that the chatbot gave them enough space and invitation to participate and steer the conversation. However, even though preferring the second version of the chatbot, multiple participants liked the fact that the first version of the chatbot gave the user a chance to freely lead the conversation and decide what to talk about. The participant that preferred the first version of the chatbot expressed it as approachable and easy to talk to and liked the open flow of the conversation. The chatbot was believed to feel more human and sophisticated when compared to the second version. Some participants found the first version too spontaneous and had a hard time answering when the chatbot did not actively steer the conversation. The first version was also believed to be more of a psychologist than a driving safety coach since focus was led more towards social and basic driver aspects. The second version managed to coach more deeply on the safe driving subject.

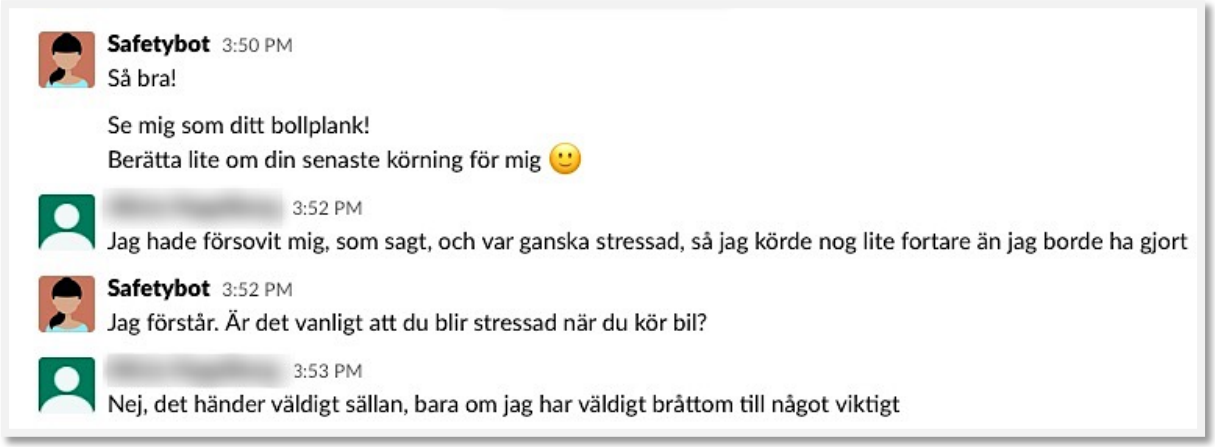

Safetybot 3:50 PM
Så bra!
Se mig som ditt bollplank!
Berätta lite om din senaste körning för mig
3:52 PM
Jag hade försovit mig, som sagt, och var ganska stressad, så jag körde nog lite fortare än jag borde ha gjort
Safetybot 3:52 PM
Jag förstår. Är det vanligt att du blir stressad när du kör bil?
3:53 PM
Nej, det händer väldigt sällan, bara om jag har väldigt bråttom till något viktigt

Image 6 - The first version of the chatbot showing low level of control and invites the participant to lead the conversation (see appendix 10 for translations).

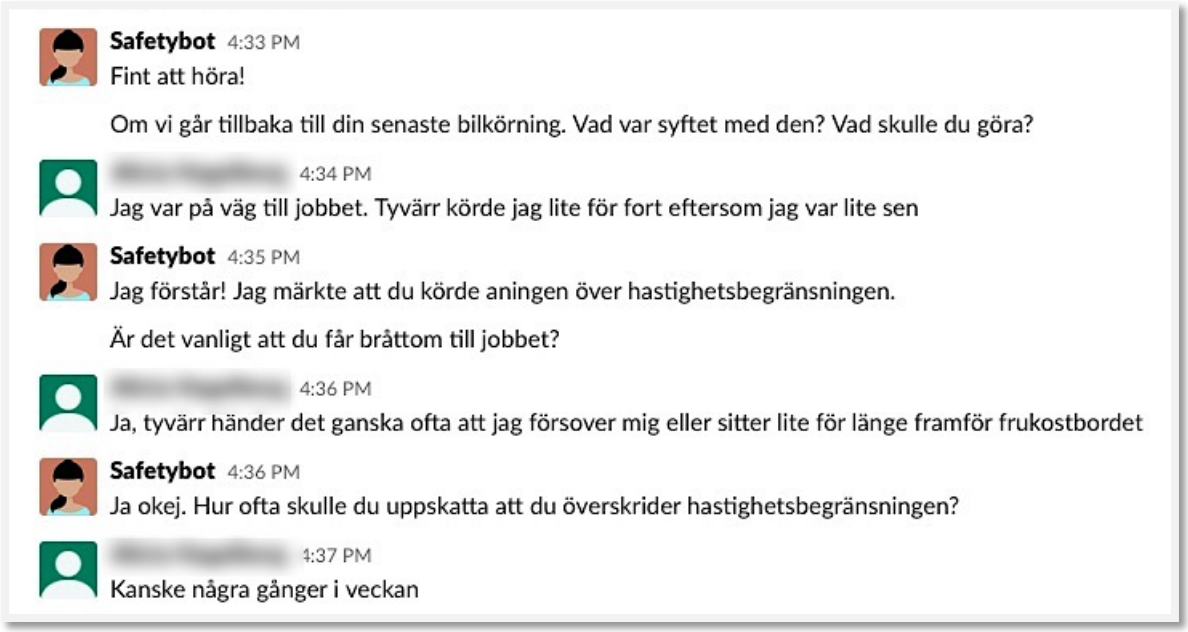

Safetybot 4:33 PM
Fint att höra!
Om vi går tillbaka till din senaste bilkörning. Vad var syftet med den? Vad skulle du göra?
4:34 PM
Jag var på väg till jobbet. Tyvärr körde jag lite för fort eftersom jag var lite sen
Safetybot 4:35 PM
Jag förstår! Jag märkte att du körde aningen över hastighetsbegränsningen.
Är det vanligt att du får bråttom till jobbet?
4:36 PM
Ja, tyvärr händer det ganska ofta att jag försover mig eller sitter lite för länge framför frukostbordet
Safetybot 4:36 PM
Ja okej. Hur ofta skulle du uppskatta att du överskrider hastighetsbegränsningen?
4:37 PM
Kanske några gånger i veckan

Image 7 - The second version of the chatbot showing high level of control where the chatbot leads the conversation (see appendix 10 for translations).

5.2.2 The chatbot's ability to refer to the past

For both versions of the chatbot, referrals related to the plan from part one of the conversation were appreciated since the chatbot could remember specific details of the users´ driving behaviors. Thereby, the users did not have to repeat any details in part two. The referral to the plans made the chatbot feel trustworthy and gave a substantial feel to the follow-up, which also increased the sense of engagement of the chatbot. On the opposite, referrals to social aspects of the first part of the second version of the chatbot was not appreciated and the reason was

Safetybot 10:41 AM
Hej igen !
Hur har det gått med renoveringen och framförallt din bilkörning sedan vi sist talades vid?
10:42 AM
Sovrummet är klart och bilkörning har funkat bra, vaknat i tid eftersom att klockradion låter som ett brandlarm
Safetybot 10:43 AM
Toppen ! Och hur är det på jobbet, lika fullt upp denna vecka?
10:44 AM
Jodå men det är ok, precis som det brukar vara. Själv då?
Safetybot 10:44 AM
Jag förstår!
Roligt att du frågar, jag mår utmärkt
Du pratade senast om att du behövde bli bättre på att sänka hastigheten. Hur har det gått med det denna vecka?
10:46 AM
Bra, tror jag. Misstänker att du sett hur jag kört, såg det bra ut?

Image 8 - The first version of the chatbot which includes referral to social aspects from the past (see appendix 10 for translations).

twofold. Firstly, the social referrals felt unnecessary and ineffective for the conversation, not leading toward the goal and purpose of the conversation. This made the participants question why the chatbot had an interest in knowing these social details. Secondly, some participants even believed the social referrals were scary and that it questioned their integrity.

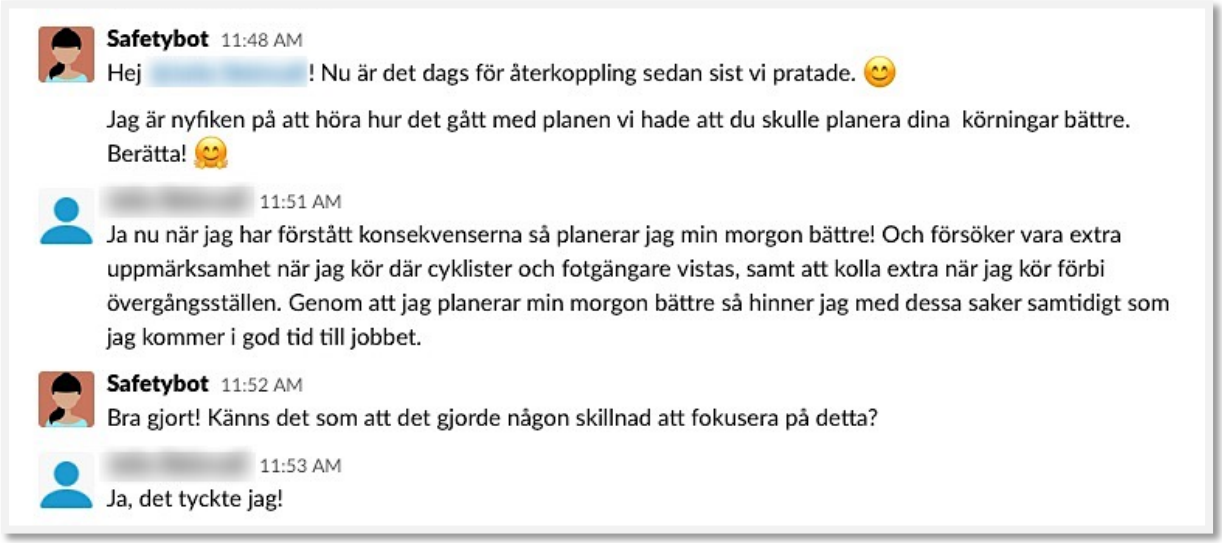

Safetybot 11:48 AM
Hej ! Nu är det dags för återkoppling sedan sist vi pratade.
Jag är nyfiken på att höra hur det gått med planen vi hade att du skulle planera dina körningar bättre.
Berätta!
11:51 AM
Ja nu när jag har förstått konsekvenserna så planerar jag min morgon bättre! Och försöker vara extra uppmärksamhet när jag kör där cyklister och fotgängare vistas, samt att kolla extra när jag kör förbi övergångsställen. Genom att jag planerar min morgon bättre så hinner jag med dessa saker samtidigt som jag kommer i god tid till jobbet.
Safetybot 11:52 AM
Bra gjort! Känns det som att det gjorde någon skillnad att fokusera på detta?
11:53 AM
Ja, det tyckte jag!

Image 9 - The second version of the chatbot which only refer to the past regarding the arranged plan (see appendix 10 for translations).

5.2.3 Themes identified from the tests

Effectivity

Effectivity was a theme that was expressed during the tests and referred to the chatbot's ability to stay on topic and efficiently strive towards the purpose of the conversation. The theme is tightly related to level of control and was also believed as a strength of the second version of the chatbot since it could lead the conversation forward in a goal-oriented way. With low effectivity, the users rather quickly lost interest and focus. The effectivity was also related to the amount of effort needed by the user to conversate with the chatbot. The first version required a big effort and thereby made it harder to stay interested in the conversation. The users had a greater stamina to conversate when they did not need a great level of effort.

Chatbot knowledge

The chatbot's knowledge refer to the level of skill the chatbot is perceived to have around the subject of matter during the conversation. In this iteration of tests, some users expressed that the chatbot did not seem like an expert on how to be a safe driver, mainly since it rarely expressed details or practical tips on how to improve. It was expressed that this was related to trust since a chatbot that does not seem to have expertise in the subject is not believed to be able to give meaningful insights on how to improve as a safe driver. Thereby, the chatbot needs to show that it has great knowledge and is an expert that have the ability to coach its users.

Advices and active coaching

From the tests, the participants made clear that they expected more advices, proposals, and facts from the chatbot in general. This is similar to the "Chatbot knowledge" theme but is more about how the chatbot interact with the users. During the tests, the chatbot let the users answer

questions or think of plans and solutions themselves and did rarely question the answers the users made. The participants expressed that they would have preferred if the chatbot was more active in giving actual advice and that it would have an opinion and give more follow-up questions.

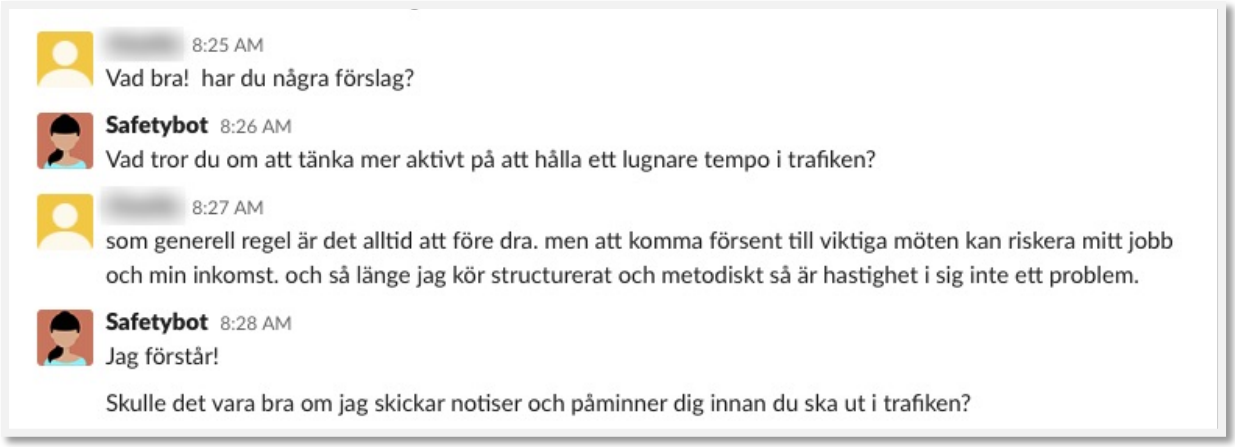

8:25 AM
Vad bra! har du några förslag?
Safetybot 8:26 AM
Vad tror du om att tänka mer aktivt på att hålla ett lugnare tempo i trafiken?
8:27 AM
som generell regel är det alltid att före dra. men att komma försent till viktiga möten kan riskera mitt jobb och min inkomst. och så länge jag kör structurerat och metodiskt så är hastighet i sig inte ett problem.
Safetybot 8:28 AM
Jag förstår!
Skulle det vara bra om jag skickar notiser och påminner dig innan du ska ut i trafiken?

Image 10 - One example when the first version of the chatbot give the participant ideas after being asked to give proposals (see appendix 10 for translations).

Safetybot 10:29 AM
Det låter som ett steg i rätt riktning! Att planera din körning kan mycket väl hjälpa dig att hålla dig inom hastighetsbegränsningen.
Hur kan vi göra konkret hädanefter för att undvika att du ska hamna i en situation som denna igen?
10:31 AM
Kanske påminna mig dagen innan, att jag har ett viktigt möte på morgonen och att det är viktigt att jag går upp i god tid för att inte stressa till jobbet. Alternativt ha en coachning i bilen som kanske lugnar ner mig eller påminner mig om min stressade körstil.
Safetybot 10:32 AM
Vilka bra idéer . Du känner ju dig själv bäst trots allt!
Jag kan absolut hjälpa dig att påminna dig dagen innan!
Coaching i bilen är dessvärre inte möjligt ännu då jag inte är kompatibel i sådana enheter, men kanske framöver!
Är det något mer du skulle kunna göra på egen hand för att inte hamna i stressiga situationer?
10:35 AM
Planera min morgon bättre och såklart, vakna i tid!
Safetybot 10:36 AM
Det är sant såklart!
Vad säger du om att testa dessa idéer och se hur det går för dig en tid framöver? :)

Image 11 - One example when the first version of the chatbot let the participant decide the plan and not giving any inputs (see appendix 10 for translations).

5.2.4 Changes to the design guide after iteration two

This iteration led to multiple changes to the design guide (see appendix 3). Firstly, a guideline regarding trust was added, where the user perception of the chatbot's expertise was considered a trust driver. Secondly, insights from this iteration regarding referrals to past added a

recommendation for the social cues, to make use of referrals as long as they do not refer to social or personal aspects. Thirdly, “Level of control” was added as a section under “Personalization” since this iteration confirmed that level of control can be adapted but should be done so with caution and only if the user is verbal and extroverted. Lastly, the “Coaching” section evolved with additional guidelines and moved “Follow-up” into a separate sub-section to coaching.

See appendix 4 for the finalized design guide.

5.2.5 Summary of results from iteration two

Five out of six participants preferred the chatbot that controlled the conversation. The one participant that preferred the freer version did so since the chatbot felt approachable and easy to talk to. Other participants felt the freer version hard to talk to. For referrals to past, none of the participants appreciated the social referrals. The purpose of social referrals was questioned, while also being related to privacy concerns. Three additional topics were identified: (1) the chatbot’s effectivity to lead the conversation toward its purpose, (2) the chatbot’s ability to seem like an expert and (3) whether the chatbot actively coached with applicable advices.

6 Discussion

In this chapter, a discussion is performed to answer the research questions defined in the thesis' introductory chapter. Results from the tests are related to research to aid the discussion.

6.1 The Guide

The first area to discuss in this chapter is the guide that has been derived initially from theory and then by two iterations of WoZ tests. The finalized guide can be found in appendix 4 and shows the complete set of guidelines that are supposed to aid in coaching chatbot design. The guide is considered non-exhaustive, since a given set of attributes has been tested in this study. Thereby, there are aspects that it does not cover and requires thought by the designer of chatbot conversations.

6.1.1 How the guide should be used

To understand what guidelines might be helpful in the design of persuasive and personalized chatbot conversations, its usage is relevant to discuss. The initial guide and its guidelines were derived from research, and most insights are relevant to address no matter what context the chatbot conversations are to be designed in. An example is the social cues, which are guidelines of how chatbots can be designed to handle the lack of face-to-face interaction and still achieve the social cues that human interaction normally contains. From my perspective, aspects like these are at the core of chatbot design and was considered useful in this thesis when the chatbot conversations for the tests were designed. Hence, the context was specifically on drivers and the coaching to become safer on the road. I believe the context to have an effect on the guidelines that were derived, and users of the guide should have that in mind. I do not believe that the context of drivers had an impact on the result and the guidelines, rather I believe the context of coaching had an impact. Some guidelines are specifically about coaching, like giving feedback and room for reflection, but some are believed to be indirectly dependent on the context. An example of a guideline that is believed to be dependent on context is the guideline to avoid referring to social or personal aspects of previous interactions. There could be contexts or uses where the social referrals would be considered fit. This can also be indicated by Fan and Poole (2006) who explain different types of personalization and where relational personalization is one of the types. I believe it to be likely that the relational personalization, that has the goal to achieve social belonging, would be interested in social referrals. However, this is not the case for coaching chatbots. Because of this, it becomes important to clarify the context of which the guidelines are applicable. I clearly stated in the guide that it primarily was guidelines for coaching chatbots, as of the title "The Coaching Chatbot".

6.1.2 Topics and content

The idea behind the guide is to make it easier to initially take important design decisions when designing a coaching chatbot. The question I ask myself is how each of the topics in the guide contributes toward this purpose. The first topic is "Transparency and trust" and explain some key aspects to build user trust. This topic become important to the guide since it clarifies important considerations that ultimately handle the major challenge of privacy, as described by Chaves and Gerosa (2019). An example of how this is handled is by the guideline that indicate

the need to communicate the purpose of the chatbot to its users. Thereby, I claim that this topic is an important contribution to the guide. The second topic is "Social cues" and state different types of social cues as well as descriptions and example of what they are. As mentioned earlier, I believe this to be at the core of chatbot conversations in general and is thereby necessary to address in the guide. This is aligned with Gnewuch *et al.* (2018) who claim that aspects that can make conversations more human-like are important. The third topic is "Personalization" and the contribution is that it states some attributes that can be used to tailor the user experience. These attributes are discussed and motivated later in this chapter. The last topic is "Coaching" and is also treated later in this chapter and is the part that is most contextual to the tests of this study. This topic contains guidelines and considerations to achieve a successful coaching chatbot. Thereby, I claim that all topics in the guide are relevant for chatbot design, but that it is important to view them from each specific context, which is also expressed in the guide.

6.2 Chatbot Personalization

In this section, each of the relevant attributes that this study has tested will be treated to discuss whether they are suitable to be used to create a personalized user experience. Note that the list of attributes is not exhaustive, as it is possible that there are more attributes to use for personalization. The motivation to each attribute is described in detail in chapter 4.

6.2.1 Chatbot personality

The first attribute to assess is personality. From the results of the tests it is clear that the participants had deviating opinions on which chatbot personality they preferred and disliked. The deviation makes itself the most apparent where the same personality type was considered preferred and worst by different participants. Likewise, both Aly and Tapus (2016) and Yorita *et al.* (2019) express a correlation between personality of the chatbot and the user, where the user was considered to prefer a similar personality for the chatbot. This indicate possible similarities to this study. There is a possibility that the deviation was because of the participants' underlying personality and that it was the cause of the deviations. However, this correlation is hard to assess since the tests did not focus on the personality of the users. Rather, the focus was to identify which attributes that was fit for personalization in a general sense. The fact that this correlation exist makes me raise further questions. Why should designers personalize on this attribute? What is the benefit? From my perspective I believe it to be related to Chaves and Gerosa (2019), who state that one key benefit of personalization for chatbots is the enrichment of interpersonal relation between the chatbot and its user.

Another interesting aspect is the description of personalities by Smestad and Volden (2019). They claimed that personality has a significant positive impact in general, but that it is dependent on the context, the task, and the user group. The question then is, how is the result in this study affected by the context of coaching drivers? The result showed that pt3 was disliked by the majority due to its harsh and accusatory tone. This could be dependent on the context, where being accusatory clearly is related to the ability to coach in a negative way. In the same way, the only participant that disliked pt2 the most explained the reason being the so called "good job" attitude. This is once again an attitude that is related to coaching, where the coach

has an overly positive approach. Nevertheless, chatbot personality is an attribute suited for personalization, which is made clear both by theory and this study. How this would be performed is up to each design, but for this study the use of a personality model is considered successful.

6.2.2 Level of control

Regarding the level of control, the result showed that the majority preferred a high level of control from the chatbot, since it led the flow of the conversation by asking directional questions. However, the preferences were not unanimous given that one participant preferred the freer version of the chatbot. Although, the freer version of the chatbot gave some participants a hard time answering. Insights about level of control was not identified in existing theory, but the results further suggest there to be a correlation to effectivity and the need for user effort. Effectivity is related to the chatbot's ability to strive toward the purpose of the conversation. With low effectivity, as the chatbot with low control had, the users tended to lose focus and interest. From my perspective, the user effort is subjective. Some users found it hard conversating with the freer chatbot, while one participant actively liked that they had the control. This could be the explanation to why the preferences differed, however it is yet to be tested in further research. Without knowing the reason behind the differing preferences, the fact that they do differ indicate a need for personalization. The question that then remains is whether this is contextual or not. During this iteration of tests, the chatbot was the initiator of the communication. One explanation could be that the chatbot automatically was expected to lead the conversation since it was the initiator. This could mean that the preference would differ if the user got to be the initiator. However, I find this unlikely given the hard time some participants had while trying to lead the conversation. The main benefit this personalization would lead to is better and unique services, as explained by Chaves and Gerosa (2019). If the user would get control over the conversation with the chatbot, it could instantly lead the conversation toward the user's motives and goals of the conversation. This would with high probability lead to better services that are tailored for the user.

6.2.3 Referral to past

Referral to past was identified as a social cue that could be used to create a personalized experience by making the chatbot remember specific events of previous interactions. For this attribute, all the participants' preferences were unanimous. Referring to the plan set in previous conversation was appreciated, while referral to social events made the participants question the integrity and purpose of the referrals. This is aligned with Chaves and Gerosa (2019) who claim the primary concern for personalized chatbots to be privacy. A transparent purpose and letting the user inform about private content are supposed to be solutions to the concern. However, the chatbot used in this study had a transparent purpose. It is even one of the topics identified for the guide. I am critical toward the solution by Chaves and Gerosa (2019), to let the user state what content is private and not. I do not believe it to be a solution in itself to the challenge of privacy. To the most it could be used to tweak the level of personalization. Due to the privacy concerns and the unanimous results, I claim referral to past to be misfit for personalization. Referral to past should be used for coaching chatbots to make use of previously set plans but using it to refer to social events is not a good idea since it might make the user question the

privacy of the chatbot. As mentioned earlier, there could be a fit for a chatbot that use relational personalization, as described by Fan and Poole (2006), but it is not suited for this context.

6.2.4 Challenges with chatbot personalization

In above sections, I have specified how personality and level of control is applicable to personalize, while referral to past is not. However, when performing actual design of personalized chatbots, there are several more factors to assess in a design. An example is aligned with Fan and Poole's (2006) dimensions of personalization, where the second dimension state that personalization has to specify to whom the personalization is for. The idea is that it could be personalized by a category of users or to specific individuals. This indicate that there are multiple levels of personalization that could be applied for each attribute. With this, there is also the possibility to use the criticized method of one-size-fits-all (Brandtzaeg & Følstad, 2017a; Chaves & Gerosa, 2019). What I believe is most important is to assess the purpose of a personalized chatbot and thereby assess what attributes can be personalized toward that purpose. From my perspective, this is a challenge that designers need to assess when designing personalized chatbots.

6.3 Chatbots for Coaching

At this section of the discussion, insights about chatbot coaching will be discussed to lead towards which considerations are important to design chatbots with the purpose to coach its users.

6.3.1 Follow-up and referrals to past

Follow-up was identified as an engagement driver in the result in multiple ways. The first indicator was from iteration one where the chatbot actively asked for a follow-up session. This made the participants motivated to actually try to change their behavior while also perceiving the chatbot as engaged. This is aligned with the view of coaching that is given by Champathes (2006), where coaching is described as an iterative process where the learner produce results and the coach then give advice on the results so the learner can adjust. From my perspective this is the effect the chatbot managed to create by the indication that further follow-up is needed. The user then becomes aware that the chatbot actually want to coach the user and wants to do so in an iterative manner. From the iterative process described by Champathes (2006), these insights also become relevant from the result of iteration two, where the actual follow-up was performed. During these tests, referrals to past plans and goals was considered an important aspect to make the chatbot feel substantial, trustworthy, and engaging. Thereby, it not only comes down to whether or not the follow-up is performed, but also to what extent the chatbot can be designed with personalization to make the follow-up more substantial and engaging. Based on this discussion I claim that follow-up is crucial to achieve successful coaching with chatbots. The coaching-process as a whole is also according to Steelman and Wolfeld (2018) tightly related to engagement and encouragement, which further support this argumentation. An additional benefit of iterative coaching is that it establishes a relationship between the user and the chatbot, which relates to arguments by O'Broin and Palmer (2010) that claim relationship and bonding as an important factor and that it is an ongoing process that needs time. Further, an interesting aspect is the context of the coaching, which in this study is drivers.

Williams, Pack and Lund (1995) states how follow-up is key for improving driver skills and is related to the motivation to improve. The idea is that the drivers are less likely to improve if follow-up is not performed. This further argue the importance of follow-ups and relates to the results of the tests where the participants felt how follow-up increased their motivation.

6.3.2 Chatbot knowledge and the use of feedback

The coaching process as described by Champathes (2006) places feedback as a core aspect of coaching. Achterkamp *et al.* (2018) and Steelman and Wolfeld (2018) also claim feedback to be important, and further express how the feedback needs to be specific and accurate toward the user. The results of the tests expressed feedback as a strength of the chatbot, mainly due to its concrete advices and tips. This indicates that the chatbot, at least in iteration one, used feedback in the way research suggests. The results of the study is thereby aligned with research (Champathes, 2006; Achterkamp *et al.*, 2018; Steelman & Wolfeld, 2018), stating that feedback is an important factor to chatbot coaching. During iteration two, an important aspect was identified where it was important to make the chatbot be perceived as an expert on the topic. This was expressed as a weakness due to its lack of details and practical tips on how to improve. Also, it was made clear that users preferred active coaching with advices, proposals, and facts from the chatbot. I believe this is related to the use of feedback. When the feedback is poor, the coaching process become limited. After all, Champathes (2006) describe feedback as the way coaching can help the learner adjust its behavior. This indicate the importance of personalized feedback and advices, and that these aspects are related to the perceived knowledge and competency of the chatbot. For drivers specifically, Amado *et al.* (2014) expressed feedback as a key factor in making drivers develop self-assessment skills. Also, Toledo and Lotan (2006) state a correlation between access to feedback and driver performance and that it directly affect driver risk and driving safety. From my perspective, feedback thereby is not only a key factor for coaching but becomes even more important when the context is coaching for drivers.

6.3.3 Coaching and chatbot personality

The chatbot's personality and attitude was considered an important factor to encourage and motivate the users during coaching. Overall it was considered important for the initiations and endings of the conversations, but specifically it also affected the use of feedback where a positive attitude was considered important to not feel accusatory. Meanwhile, personality was expressed by Smestad and Volden (2019) as dependent on its context, task and user group. This could indicate a similar relationship, where the context of coaching gives additional expectations on chatbot personality to have a positive attitude and thereby encourage and motivate its users.

6.4 Method Discussion

When reviewing how well the method was planned and performed, I feel satisfied with the results and how they were achieved. However, there are some decisions that could be discussed. Some are limitations that could not be handled during the study, while others got adapted between the two iterations. The first decision is the use of WoZ to test the chatbot conversations in each iteration of the study. Some criticism that could be expressed towards the method is that

it puts a cognitive load on the wizard that acted as the chatbot. This could lead to inconsistency regarding the performance of the chatbot. For the first iteration this is not considered an issue since both the wizard and the users had manuscripts to follow. Thereby, the margins of error or inconsistencies were small. For iteration two, the wizard performance played a greater role while also requiring a greater effort from the users. This was due to the fact that the wizard had to react on the answers of the users and could thereby not be completely prepared on the conversation. However, one of the main purposes of iteration two was to give the user the control of the conversation flow and thereby the flexibility of WoZ is considered beneficial from my perspective. Overall, the use of WoZ was necessary for the study since it did not aim to include any technical details or implementational aspects. Thereby I believe the use of WoZ was rather necessary and had a good fit with the study.

Another aspect that is related to the tests is the use of a user manuscript in the first iteration. My first thought was that it would be too challenging to let the users write freely. However, after the first iteration I experienced that a free approach would let the users reflect over the conversations even more, which led me into testing it for the second iteration. I believe that this decision was beneficial and if I would have performed the study again, it would have been a good idea to incorporate it in both iterations. Although, I do not believe this has had any effect on the result of the study since the users could get a feel for the different chatbot personalities even with a manuscript. Another learning that I took with me from iteration one to iteration two is the use of a baseline version of the conversation. The first iteration used three versions of the conversation, where two were contrasting and one was baseline. It was common that the users expressed that they liked some features of the baseline version since it was balanced on the different attributes. It became easy to express a preference towards it. In iteration two I only used two contrasting versions, which led into deeper discussions with the users when talking about the versions. This could have improved iteration one but is not considered crucial to the result since the interviews performed after the tests made it possible to assess the contrasting versions anyhow. The last learning that was learnt from iteration one was to include a wider range of users for the tests in iteration two. In the first iteration, all users have had their driver's license for less than 10 years, while in iteration two it ranged up to 34 years of experience. The reason is to increase the variety and make sure the result is not biased based on a limited audience.

7 Conclusions

This chapter concludes the thesis and answer the research questions from the introductory chapter. The main research question, "How can chatbot conversations be designed that has a persuasive goal of safer driving?", has been divided into three sub-questions and are answered below.

7.1 Guidelines to Help in Chatbot Design

In this section the following research question is answered; "*What guidelines can help in the design of persuasive and personalized human-chatbot conversations?".* The complete guide and all guidelines that are considered helpful for the design of persuasive and personalized human-chatbot conversations can be found in appendix 4. The topics that the guide treats are transparency and trust, social cues, personalization, and coaching. An important notion is the context the guide was derived from, namely coaching. The guidelines are directly applicable for that context but might extend to other contexts. Thereby, each guideline should be assessed based on the current context of the chatbot that is to be designed.

7.2 Personalization Attributes

Here, the following research question is answered; "*What attributes of the chatbot can be adapted towards individual users to achieve a personalized user experience?".* Personalization has been identified as an important part of chatbot design as it can help create a tailored user experience. Chatbot personality and level of control has been stated as suitable for personalization. Adaptation of chatbot personality is considered important to the enrichment of interpersonal relation between the user and the chatbot. Level of control helps tailor the services that the chatbot offer by adapting the level the chatbot controls the conversation. An attribute that was tested in the study and which was not considered fit for adaptation is how the chatbot refers to past interactions. Referrals are important to make conversations feel personalized, especially for coaching and to the plans set during coaching sessions, but how the chatbot uses referrals does not need adaptation. Referrals to social or personal aspects has been identified as a risk, where the users might question the integrity of the chatbot.

7.3 Considerations for Coaching Chatbots

The following question is answered in this section; *"What considerations should be assessed for persuasive chatbot conversations to motivate and encourage the users?".* There are multiple considerations that has been identified as crucial for persuasive chatbot conversations. The first is the use of follow-ups, which is considered an engagement and motivation driver. The chatbot should express its desire to have follow-ups and also make sure to perform the follow-up. Here, referrals to past goals are considered beneficial. Further, feedback is another consideration that should be assessed. Feedback is at the core of coaching and is used to give the users actual advice to act upon, while also making the users perceive the chatbot as a competent entity. Lastly, a consideration should be the chatbot's personality, due to the fact that a personality with a positive attitude encourage and motivate the users.

8 Future Research

There are multiple possible future research topics that would be of interest to look into based on this study. Firstly, a natural addition to this thesis would be studies that further test the guide that was created. The guide could be extended with additional attributes for the same context or be tested in a completely different context. This could lead to further refinement of the guidelines as well as more knowledge on for which contexts it is applicable. Secondly, a subject of interest for future research would be to take a technical approach to the findings of this thesis. This could mean implementing an actual chatbot that test personalization or coaching as this thesis suggests. Lastly, as a general topic, how chatbots can be used to help drivers become safer in traffic is still relevant to further investigate. Here, an idea would be to incorporate a voice-based chatbot, which opens the possibility to coach while driving.

9 References

Achterkamp, R., Dekker-Van Weering, M. G., Evering, R. M., Tabak, M., Timmerman, J. G., Hermens, H. J. & Vollenbroek-Hutten, M. M. (2018). Strategies to improve effectiveness of physical activity coaching systems: Development of personas for providing tailored feedback, *Health Informatics Journal*, 24(1), pp. 92–102.

Aly, A. & Tapus, A. (2016). Towards an intelligent system for generating an adapted verbal and nonverbal combined behavior in human–robot interaction, *Autonomous Robots*, 40(2), pp. 193–209.

Amado, S., Arikan, E., Kaça, G., Koyuncu, M. & Turkan, B. N. (2014). How accurately do drivers evaluate their own driving behavior? An on-road observational study, *Accident Analysis and Prevention*, 63, pp. 65–73.

Araujo, T. (2018). Living up to the chatbot hype: The influence of anthropomorphic design cues and communicative agency framing on conversational agent and company perceptions, *Computers in Human Behavior*, 85, pp. 183–189.

Bernsen, N. O., Dybkjær, H. & Dybkjær, L. (1993). Wizard of Oz Prototyping : When and How ?, *Cognitive Science*, 94, pp. 1–13.

Boyle, G. J. (1995). Myers-Briggs Type Indicator (MBTI): Some Psychometric Limitations, *Australian Psychologist*, 30(1), pp. 71–74.

Brandtzaeg, P. B. & Følstad, A. (2017a). Chatbots and the New World of HCI, *Interactions*, 24(4), pp. 38–42.

Brandtzaeg, P. B. & Følstad, A. (2017b). Why People Use Chatbots, in *Proceedings of the 4th International Conference of Internet Science, INSCI 2017*, pp. 377–392.

Brandtzaeg, P. B. & Følstad, A. (2018). Chatbots: Changing uder needs and motivations, *Interactions*, 25(5), pp. 38–43.

Champathes, M. R. (2006). Coaching for performance improvement: the 'COACH' model, *Development and Learning in Organizations: An International Journal*, 20(2), pp. 17–18.

Chaves, A. P. & Gerosa, M. A. (2019). How should my chatbot interact? A survey on human-chatbot interaction design.

Dow, S., MacIntyre, B., Lee, J., Oezbek, C., Bolter, J. D. & Gandy, M. (2005). Wizard of Oz support throughout an iterative design process, *IEEE Pervasive Computing*, 4(4), pp. 18–26.

Fan, H. & Poole, M. S. (2006). What Is Personalization? Perspectives on the Design and Implementation of Personalization in Information Systems, *Journal of Organizational Computing and Electronic Commerce*, 16(3–4), pp. 179–202.

Feine, J., Gnewuch, U., Morana, S. & Maedche, A. (2019). A Taxonomy of Social Cues for Conversational Agents, *International Journal of Human-Computer Studies*, 132, pp. 138–161.

Fogg, B. (1998). Persuasive Computers: Perpectives and Research Directions, in *Proceedings of the SIGCHI conference on Human factors in computing systems - CHI '98*. New York, New

York, USA: ACM Press, pp. 225–232.

Fogg, B., Cuellar, G. & Danielson, D. (2009). Motivating, Influencing, and Persuading Users, in *The human-computer interaction handbook: fundamentals, evolving technologies and emerging applications*. L. Erlbaum Associates Inc, pp. 133–147.

Følstad, A., Nordheim, C. B. & Bjørkli, C. A. (2018). What Makes Users Trust a Chatbot for Customer Service? An Exploratory Interview Study, i, pp. 194–208.

Ghandeharioun, A., McDuff, D., Czerwinski, M. & Rowan, K. (2019). Towards Understanding Emotional Intelligence for Behavior Change Chatbots, in *Proceedings of the 8th International Conference on Affective Computing and Intelligent Interaction (ACII)*. IEEE, pp. 8–14.

Gnewuch, U., Morana, S., Adam, M. T. P. & Maedche, A. (2018). Faster is Not Always Better: Understanding the Effect of Dynamic Response Delays in Human-Chatbot Interaction, in *26th European Conference on Information Systems, ECIS 2018*, pp. 1–17.

Hans, A. & Hans, E. (2015). Kinesics, Haptics and Proxemics: Aspects of Non -Verbal Communication, *IOSR Journal Of Humanities And Social Science Ver. IV*, 20(2), pp. 47–52.

Harjumaa, M., Segerståhl, K. & Oinas-Kukkonen, H. (2009). Understanding Persuasive Software Functionality in Practice: A Field Trial of Polar FT60, in *Proceedings of the 4th International Conference on Persuasive Technology*. New York, New York, USA: ACM Press, pp. 1–9.

Hertenstein, M. J., Keltner, D., App, B., Bulleit, B. A. & Jaskolka, A. R. (2006). Touch communicates distinct emotions., *Emotion*, 6(3), pp. 528–533.

Hill, J., Randolph Ford, W. & Farreras, I. G. (2015). Real conversations with artificial intelligence: A comparison between human-human online conversations and human-chatbot conversations, *Computers in Human Behavior*. Elsevier Ltd, 49, pp. 245–250.

Jibril, T. A. & Abdullah, M. H. (2013). Relevance of Emoticons in Computer-Mediated Communication Contexts: An Overview, *Asian Social Science*, 9(4).

Kruger, J. & Dunning, D. (1999). Unskilled and Unaware of It: How Difficulities in Recognizing One's Own Incompetence Lead to Inflated Self-assesments, *Journal of Personality and Social Psychology*, 77(6), pp. 1121–1134.

Laplante, D. & Ambady, N. (2003). On How Things Are Said, *Journal of Language and Social Psychology*, 22(4), pp. 434–441.

Market Insider (2019). *Global Chatbot Market Anticipated to Reach $9.4 Billion by 2024 - Robust Opportunities to Arise in Retail & eCommerce*, *Market Insider*. https://markets.businessinsider.com/news/stocks/global-chatbot-market-anticipated-to-reach-9-4-billion-by-2024-robust-opportunities-to-arise-in-retail-ecommerce-1028759508 (Accessed: 20/02/2020).

Microsoft (2018). *Responsible bots: 10 guidelines for developers of conversational AI*, *Microsoft*. https://www.microsoft.com/en-us/research/uploads/prod/2018/11/Bot_Guidelines_Nov_2018.pdf (Accessed: 03/03/2020).

Müller, L., Mattke, J., Maier, C., Weitzel, T. & Graser, H. (2019). Chatbot Acceptance: A Latent Profile Analysis on Individuals' Trust in Conversational Agents, in *Proceedings of the 2019 on Computers and People Research Conference - SIGMIS-CPR '19*. New York, New York, USA: ACM Press, pp. 35–42.

Nass, C., Moon, Y., Fogg, B. J., Reeves, B. & Dryer, D. C. (1995). Can computer personalities be human personalities?, *International Journal of Human-Computer Studies*. New York, New York, USA: ACM Press, 43(2), pp. 223–239.

O'Broin, A. & Palmer, S. (2010). Exploring key aspects in the formation of coaching relationships: initial indicators from the perspective of the coachee and the coach, *Coaching: An International Journal of Theory, Research and Practice*, 3(2), pp. 124–143.

Skjuve, M. & Brandtzaeg, P. B. (2019). Measuring User Experience in Chatbots: An Approach to Interpersonal Communication Competence, in *Internet Science. INSCI 2018 Lecture Notes in Computer Science*. Springer, Cham, pp. 113–120.

Smestad, T. L. & Volden, F. (2019). Chatbot Personalities Matters: Improving the User Experience of Chatbot Interfaces, in *INSCI 2018: Internet Science*, pp. 170–181.

Steelman, L. A. & Wolfeld, L. (2018). The Manager as Coach: The Role of Feedback Orientation, *Journal of Business and Psychology*, 33(1), pp. 41–53.

Toader, D.-C., Boca, G., Toader, R., Măcelaru, M., Toader, C., Ighian, D. & Rădulescu, A. T. (2019). The Effect of Social Presence and Chatbot Errors on Trust, *Sustainability*, 12(1), p. 256.

Toledo, T. & Lotan, T. (2006). In-Vehicle Data Recorder for Evaluation of Driving Behavior and Safety, *Transportation Research Record: Journal of the Transportation Research Board*, 1953, pp. 112–119.

Trafikverket (2019). *Nollvisionen - tillsammans räddar vi liv*. https://www.trafikverket.se/for-dig-i-branschen/samarbete-med-branschen/Samarbeten-for-trafiksakerhet/tillsammans-for-nollvisionen/ (Accessed: 17/04/2020).

Transportstyrelsen (2020). *Statistik över vägtrafikolyckor*. https://www.transportstyrelsen.se/sv/vagtrafik/statistik/olycksstatistik/statistik-over-vagtrafikolyckor/ (Accessed: 17/04/2020).

Varvel, T., Adams, S. G., Pridie, S. J. & Ruiz Ulloa, B. C. (2004). Team Effectiveness and Individual Myers-Briggs Personality Dimensions, *Journal of Management in Engineering*, 20(4), pp. 141–146.

Vetenskapsrådet (2017). *Sweden 2017: GOOD RESEARCH PRACTICE*.

Williams, A. F., Pack, N. N. & Lund, A. K. (1995). Factors that drivers say motivate safe driving practices, *Journal of Safety Research*, 26(2), pp. 119–124.

Yorita, A., Egerton, S., Oakman, J., Chan, C. & Kubota, N. (2019). Self-Adapting Chatbot Personalities for Better Peer Support, in *2019 IEEE International Conference on Systems, Man and Cybernetics (SMC)*. IEEE, pp. 4094–4100.

10 Appendices

10.1 Appendix 1 – Design guidelines from existing literature (first draft)

Design Guidelines for Chatbot Conversations

This guide aims to assist with guidelines for human-chatbot conversations and could be used as a tool to make important design decisions easier. The guide is directed at designers or other practitioners that needs support when designing personalized chatbot conversations.

Transparency

Transparency and trust go hand in hand, since transparency is an enabler of trust. It is important to be transparent from the beginning to make users comfortable using the chatbot right from the start of their experience.

- The chatbot's trust is determined by the trust of the service it belongs to. Make sure to assess trust at service level.
- Be aware of ethical aspects of the chatbot and handle them accordingly.
- Communicate the purpose of the chatbot to its users.
- State how the users can benefit from the chatbot.
- Be clear about it being a chatbot and not a human.

Social Cues

There are different types of social cues that a designer needs to consider for a chatbot to imitate or compensate the cues of human dialogue. The table below show different categories and types of social cues that can be used for a chatbot.

Category	*Sub-category*	*Description*	*Example*
Verbal	Content	What is said or written	Greetings, farewells, referrals to the past, jokes, small talk
	Style	How it is said or written	Level of formality, sentence complexity, language used
Visual	Appearance	The visual design of the chatbot. Design choices are based on the preferable level of human likeness	Name of the bot, gender, facial features and level of realism of bot avatar
	Computer-mediated communication	The design of letters and emojis that will be used by the chatbot when conversating	Typeface of text, use of emoticons,
Invisible	Response time	The flow of the conversation	X seconds delay before answering

Specific recommendations

- The gender of the chatbot should be portrayed as female since it is considered to have a positive impact on the users' attitudes towards the chatbot.
- Use dynamic response delay in order to get a natural flow in the conversations.
- Use emoticons when expressing emotions, since it contributes to conversations when not being face-to-face.

Personalization

Personalization enables a tailored experience for the users that interacts with the chatbot.

- Adapt content to individuals rather than one-size-fits-all approach.
- Consider the chatbot's personality
  - Adapt chatbot's personality to its users, similar personality to the user is preferable.
  - The personality is dependent on context, the function of the chatbot, its user group.
- Choose a personality model to lean on when creating a personality for the chatbot.

10.2 Appendix 2 – Design Guidelines with modifications from iteration one (second draft)

Design Guidelines for Chatbot Conversations

This guide aims to assist with guidelines for human-chatbot conversations and could be used as a tool to make important design decisions easier. The guide is directed at designers or other practitioners that needs support when designing personalized chatbot conversations.

Transparency

Transparency and trust go hand in hand, since transparency is an enabler of trust. It is important to be transparent from the beginning to make users comfortable using the chatbot right from the start of their experience.

- The chatbot's trust is determined by the trust of the service it belongs to. Make sure to assess trust at service level.
- Be aware of ethical aspects of the chatbot and handle them accordingly.
- Communicate the purpose of the chatbot to its users.
- State how the users can benefit from the chatbot.
- Be clear about it being a chatbot and not a human.

Social Cues

There are different types of social cues that a designer needs to consider for a chatbot to imitate or compensate the cues of human dialogue. The table below show different categories and types of social cues that can be used for a chatbot.

Category	*Sub-category*	*Description*	*Example*
Verbal	Content	What is said or written	Greetings, farewells, referrals to the past, jokes, small talk
	Style	How it is said or written	Level of formality, sentence complexity, language used
Visual	Appearance	The visual design of the chatbot. Design choices are based on the preferable level of human likeness	Name of the bot, gender, facial features and level of realism of bot avatar
	Computer-mediated communication	The design of letters and emojis that will be used by the chatbot when conversating	Typeface of text, use of emoticons,
Invisible	Response time	The flow of the conversation	X seconds delay before answering

Specific recommendations

- The gender of the chatbot should be portrayed as female since it is considered to have a positive impact on the users' attitudes towards the chatbot.
- Use dynamic response delay in order to get a natural flow in the conversations.
- Use emoticons when expressing emotions, since it contributes to conversations when not being face-to-face.

Personalization

Personalization enables a tailored experience for the users that interacts with the chatbot. The tailored experience is dependent on adapting the chatbot to each individual user rather than going for a one-size-fits-all approach.

Chatbot Personality

The chatbot's personality is an attribute fit to consider when designing for a tailored chatbot experience.

- Chatbot personality is best adapted to match a similar personality as the user.
- Assess the environment the chatbot is to be implemented in and adjust its personality accordingly.
  - The personality is dependent on context, the function of the chatbot, and its user group.
- Choose a personality model to lean on when creating personalities for the chatbot.
  - This can help you make the aspects of personality more concrete.
- If the user personality is not known, go for a baseline personality.
  - Lean toward extroversion to create a natural flow in the conversation.
  - Find a balance between formality and informality to make the chatbot feel both kind and serious.
  - Avoid detailed statistics – users do not like being confused.

Coaching

About creating a coaching experience that motivate and encourage the users interacting with the chatbot.

- Give room for reflection by using questions that make the user think and self-assess.
- Give feedback that is concrete, specific, and informative.
- Create team spirit and engagement by expressing a desire to have a follow-up.
  - A chatbot that is interested in progress feels engaged.
- Invite the user to initiate further dialogs, the chatbot does not always have to be the one initiating conversation. This also gives a sense of engagement
- Design the chatbot with a positive attitude since it leads to a greater sense of encouragement.
- Avoid making the chatbot feel accusatory and interrogative, even slightly.
  - It could lead to a decrease in user motivation.

10.3 Appendix 3 - Design Guidelines with modifications from iteration two (third draft)

Design Guidelines for Chatbot Conversations

This guide aims to assist with guidelines for human-chatbot conversations and could be used as a tool to make important design decisions easier. The guide is directed at designers or other practitioners that needs support when designing personalized chatbot conversations.

Transparency and trust

Transparency and trust go hand in hand since transparency is an enabler of trust. It is important to be transparent from the beginning to make users comfortable using the chatbot right from the start of their experience.

- The chatbot's trust is determined by the trust of the service it belongs to. Make sure to assess trust at service level.
- Be aware of ethical aspects of the chatbot and handle them accordingly.
- Communicate the purpose of the chatbot to its users.
- State how the users can benefit from the chatbot.
- Be clear about it being a chatbot and not a human.
- Make the chatbot an expert in the user's eyes. If the chatbot does not clearly state its knowledge around the subject, the user might not trust the chatbot to be competent enough to be helpful.

Social Cues

There are different types of social cues that a designer needs to consider for a chatbot to imitate or compensate the cues of human dialogue. The table below show different categories and types of social cues that can be used for a chatbot.

Category	*Sub-category*	*Description*	*Example*
Verbal	Content	What is said or written	Greetings, farewells, referrals to the past, jokes, small talk
	Style	How it is said or written	Level of formality, sentence complexity, language used
Visual	Appearance	The visual design of the chatbot. Design choices are based on the preferable level of human likeness	Name of the bot, gender, facial features and level of realism of bot avatar
	Computer-mediated communication	The design of letters and emojis that will be used by the chatbot when conversating	Typeface of text, use of emoticons,
Invisible	Response time	The flow of the conversation	X seconds delay before answering

Specific recommendations for social cues

- The gender of the chatbot should be portrayed as female since it is considered to have a positive impact on the users' attitudes towards the chatbot.
- Use dynamic response delay in order to get a natural flow in the conversations.
- Use emoticons when expressing emotions, since it contributes to conversations when not being face-to-face. However, do not overuse emoticons since it might make the chatbot feel unprofessional.
- Referrals to past events can be both beneficial and discouraging depending on how it is used.
    - Use referrals to parts of previous conversations that is relevant to the purpose of the current conversation. This can make the chatbot feel cognitively competent.
    - Avoid referring to social or personal aspects - it can scare the users or make them question the integrity of the chatbot.

Personalization

Personalization enables a tailored experience for the users that interacts with the chatbot. The tailored experience is dependent on adapting the chatbot to each individual user rather than going for a one-size-fits-all approach.

Chatbot Personality

The chatbot's personality is an attribute fit to consider when designing for a personalized chatbot experience.

- Chatbot personality is best adapted to match a similar personality as the user.
- Assess the environment the chatbot is to be implemented in and adjust its personality accordingly.
    - The personality is dependent on context, the function of the chatbot, and its user group.
- Choose a personality model to lean on when creating personalities for the chatbot.
    - This can help you make the aspects of personality more concrete.
- If the user personality is not known, go for a baseline personality.
    - Lean toward extroversion to create a natural flow in the conversation.
    - Find a balance between formality and informality to make the chatbot feel both kind and serious.
    - Avoid detailed statistics – users do not like being confused.

Level of control

This attribute is about the role the chatbot takes during the conversation. Namely, if it steers the conversation by active questions or follow the user. When designing a personalized chatbot experience, the level of control should be adapted with caution:

- Use a baseline approach where the chatbot control the flow of the conversation toward its purpose.
    - The chatbot's ability to effectively lead the conversation toward its purpose is important to keep the users interested and focused.
- The chatbot could adapt toward a freer approach for users that are extroverted and verbal, but some level of control is still required.
- Make it easy for the user to interact with the chatbot. If a great effort is required the user might lose interest in the conversation.

Coaching

About creating a coaching experience that motivate and encourage the users interacting with the chatbot.

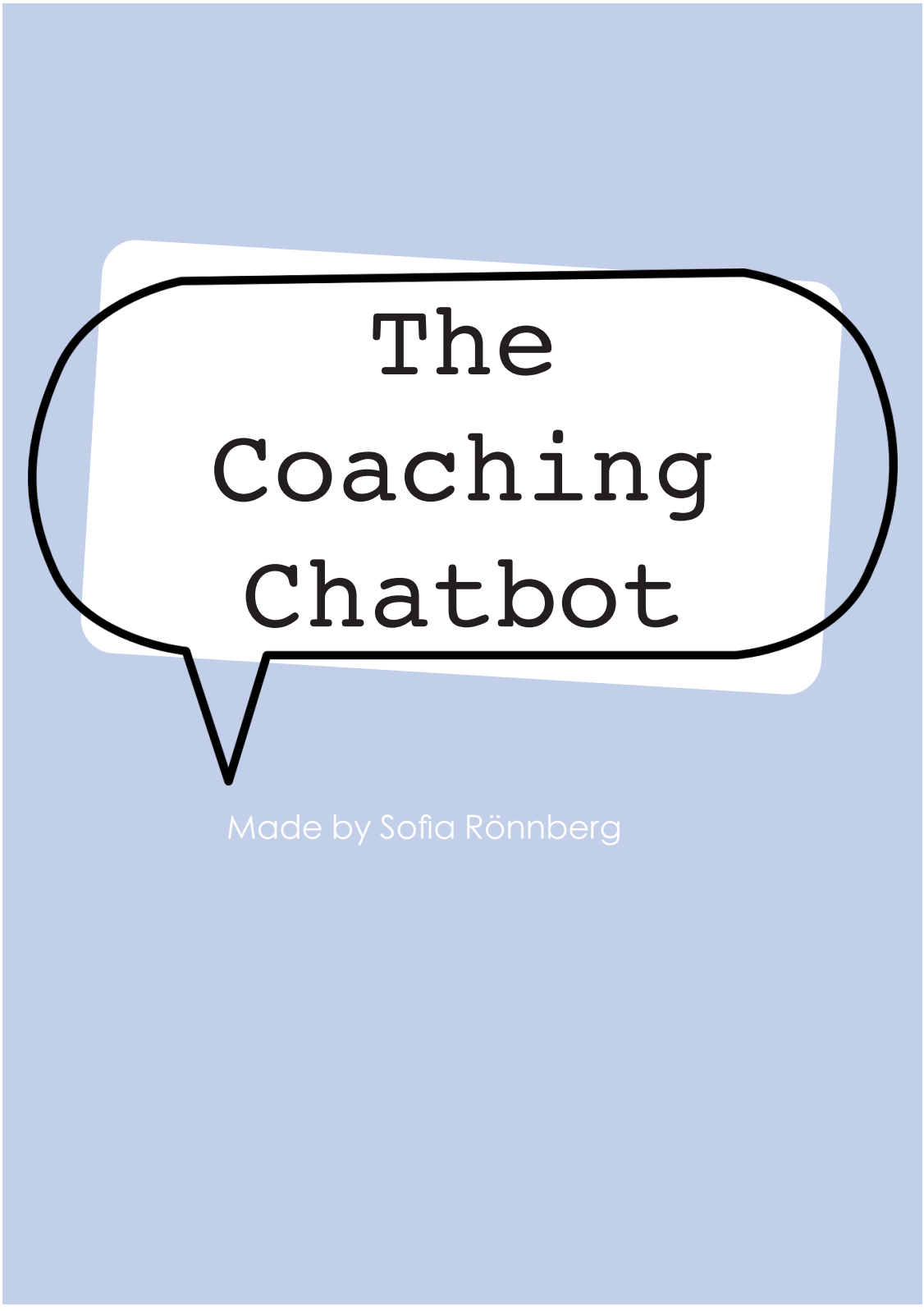
- Give room for reflection by using questions that make the user think and self-assess.
- Give feedback that is concrete, specific, and informative.
- The chatbot should not only make the user think by themselves with follow-up questions, it should also actively give advices, proposal to improvements and facts around the subject.
- Design the chatbot with a positive attitude since it leads to a greater sense of encouragement.
- Avoid making the chatbot feel accusatory and interrogative, even slightly.
    - It could lead to a decrease in user motivation.

Follow-up

Performing follow-ups is an important part of coaching and will make the user more willing to strive towards the set goals, while also providing continuity to the coaching.

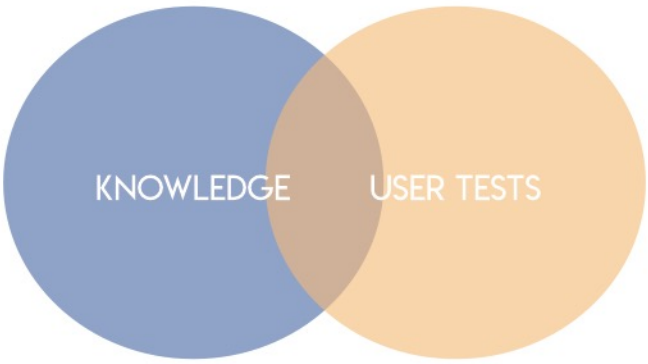
- Create team spirit and engagement by expressing a desire to have a follow-up.
    - A chatbot that is interested in progress feels engaged.
- Invite the user to initiate further dialogs, the chatbot does not always have to be the one initiating conversation. This also gives a sense of engagement
- When performing the follow-up, use referrals to goals or plans made in previous interactions.
    - This makes the follow-up feel substantial and is considered an engagement driver.

10.4 Appendix 4 – The finalized guide



The Development of the Guide

This compendium consists of guidelines that are created based on knowledge from existing research and iteratively gathered insights from user tests. The guide was formed in four steps. First an initial knowledge check led to a baseline version that was derived from research. After the baseline version was created, two iterations of user testing of different aspects that are relevant for design of coaching chatbots was performed. This led to increased insight to all topics addressed in the guide. The last step consisted of a visual touch-up to illustrate the guidelines and led to the final version of the guide, which is the current form.



How to Use the Guide

This compendium aims to assist with guidelines for human–chatbot conversations and could be used as a tool to make important design decisions easier to assess in early stages of the design process. The compendium is directed at designers or other practitioners that needs support when designing coaching chatbots and their conversations. The focus was primarily on chatbots that has the purpose of coaching its users, but the three initial topics of the guide is relevant for other purposes as well.

The guidelines in this compendium should be seen as guidance for design and decision–making. It is important to apply these guidelines with your own judgement of what is suited for your context. Thereby, see this guide as a tool rather than a rulebook.

The compendium is divided into four topics:

1. Transparency and Trust
2. Social Cues
3. Personalization
4. Coaching

Transparency and Trust

Transparency and trust go hand in hand since transparency is an enabler of trust. It is important to be transparent from the beginning to make users comfortable using the chatbot right from the start of their experience.

Guidelines to consider

- The chatbot's trust is determined by the trust of the service it belongs to. Make sure to assess trust at service level.
- Be aware of ethical aspects of the chatbot and handle them accordingly.
- Communicate the purpose of the chatbot to its users.
- State how the users can benefit from the chatbot.
- Be clear about it being a chatbot and not a human.
- Make the chatbot an expert in the user's eyes. If the chatbot does not clearly state its knowledge around the subject, the user might not trust the chatbot to be competent enough to be helpful.

This is an example of a chatbot stating its purpose, but there are many ways to be transparent.

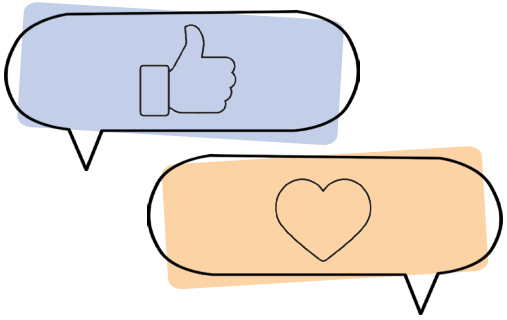
Social Cues

There are different types of social cues that a designer needs to consider for a chatbot to imitate or compensate the cues of human dialogue. The table below show different categories and types of social cues that can be used for a chatbot.

Category	*Sub-category*	*Description*	*Example*
Verbal	Content	What is said or written	Greetings, farewells, referrals to the past, jokes, small talk
	Style	How it is said or written	Level of formality, sentence complexity, language used
Visual	Appearance	The visual design of the chatbot. Design choices are based on the preferable level of human likeness	Name of the bot, gender, facial features and level of realism of bot avatar
	Computer-mediated communication	The design of letters and emojis that will be used by the chatbot when conversating	Typeface of text, use of emoticons,
Invisible	Response time	The flow of the conversation	X seconds delay before answering

Specific Recommendations for Social Cues

- The gender of the chatbot should be portrayed as female since it is considered to have a positive impact on the users' attitudes towards the chatbot.
- Use dynamic response delay in order to get a natural flow in the conversations.
- Use emoticons when expressing emotions, since it contributes to conversations when not being face-to-face. However, do not overuse emoticons since it might make the chatbot feel unprofessional.
- Referrals to past events can be both beneficial and discouraging depending on how it is used.
  - Use referrals to parts of previous conversations that is relevant to the purpose of the current conversation. This can make the chatbot feel cognitively competent.
  - Avoid referring to social or personal aspects since it can scare the users or make them question the integrity of the chatbot.



Personalization

Personalization enables a tailored experience for the users that interacts with the chatbot. The tailored experience is dependent on adapting the chatbot to each individual user rather than going for a one-size-fits-all approach.

Chatbot Personality

The chatbot's personality is an important attribute to consider.

- Chatbot personality is best adapted to match a similar personality as the user.
- Assess the environment the chatbot is to be implemented in and adjust its personality accordingly.
  - The personality is dependent on context, the function of the chatbot, and its user group.
- Choose a personality model to lean on when creating personalities for the chatbot.
  - This can help you make the aspects of personality more concrete.
- If the user personality is not known, go for a baseline personality
  - Lean toward extroversion to create a natural flow in the conversation.
  - Find a balance between formality and informality to make the chatbot feel both kind and serious.
  - Avoid complicated statistics – users do not like being confused.

Level of Control

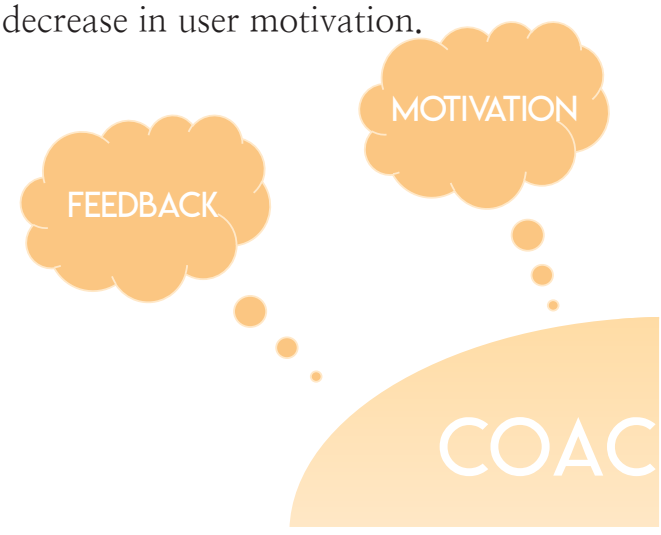
This attribute is about the role the chatbot takes during the conversation. Namely, if it steers the conversation by active questions or follow the user. When designing a personalized chatbot experience, the level of control should be adapted with caution.

- Use a baseline approach where the chatbot control the flow of the conversation toward its purpose.
  - The chatbot's ability to effectively lead the conversation toward its purpose is important to keep the users interested and focused.
- The chatbot could adapt toward a freer approach for users that are extroverted and verbal, but some level of control is still required.
- Make it easy for the user to interact with the chatbot. If a great effort is required the user might lose interest in the conversation.

Coaching

Coaching is a two-way communication process that occur iteratively. Below, it is stated how to create a coaching experience that motivate and encourage the users interacting with the chatbot.

- Give room for reflection by using questions that make the user think and self-assess.
- Give feedback that is concrete, specific, and informative.
- The chatbot should not only make the user think by themselves with follow-up questions, it should also actively give advices, proposal to improvements and facts around the subject.
- Design the chatbot with a positive attitude since it leads to a greater sense of encouragement.
- Avoid making the chatbot feel accusatory and interrogative, even slightly.
    - It could lead to a decrease in user motivation.



Follow-Up

Performing follow-ups is an important part of coaching and will make the user more willing to strive towards the set goals, while also providing continuity to the coaching.

- Create team spirit and engagement by expressing a desire to have a follow-up.
  - A chatbot that is interested in progress feels engaged.
- Invite the user to initiate further dialogs, the chatbot does not always have to be the one initiating conversation. This also gives a sense of engagement
- When performing the follow-up, use referrals to goals or plans made in previous interactions.
  - This makes the follow-up feel substantial and is considered an engagement driver.

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10.5 Appendix 5 – Scenario on speeding for user tests in iteration one

Scenario

Det har varit en lång och stressfull dag på din arbetsplats. Denna dag var det svårt att komma ifrån arbetet och du kände att du behövde jobba över för att få klart alla arbetsuppgifter i tid. När klockan har passerat 18:30 inser du att du hade en inbokad tandläkartid vid 19:00. Stressen bli mer påtaglig och du rusar ner till parkeringen för att ta bilen till den lokala tandläkarkliniken. Klockan har hunnit bli 18:42 när motorn startar. Trafiken är måttlig och längst vägen stöter du på en hel del rödljus som du inte lyckas tajma. Klockan tickar, minut för minut. Du varvar mellan dragläge och att stå på bromsen, i tron om att du snart får komma ifrån det ena rödljuset efter det andra. Det är en bit kvar till tandläkarkliniken och du inser att det är knappt om tid. När du får chansen gasar du på och uppfattar inte hastighetsskyltarna eller vad som händer i din omgivning speciellt mycket. Tillslut anländer du till tandläkarkliniken och springer uppför trapporna och hinner till ditt besök trots allt.

Sen en tid tillbaka hade du laddat ner en app, kallad DriveSafe, på din telefon som hade syftet att hjälpa bilister att bli säkrare bilförare. Du fattade intresse för appen och ville se om det kunde hjälpa dig att bli säkrare på vägarna. Efter ditt tandläkarbesök får du en notis i din mobil från DriveSafe-appen. Appen har registrerat dig för fortkörning vid den bilresa du gjorde för att hinna med ditt tandläkarbesök. I och med detta riskfyllda beteende vill chatboten Safetybot i appen nu ha en dialog med dig när du har några minuter över.

10.6 Appendix 6 – Conversations with different personality types for iteration one

Conversations for Iteration 1

This working document is written in Swedish since the user tests will be performed with Swedish as language. The table shows the flow of the conversation followed by the three different personality types of the chatbot. The flow is the same for all personality types but differs in how the text is expressed.

Flöde	Pt1	Pt2 (ENF)	Pt3 (INT)
Öppna för dialog	Hej [namn] ☺	Hej [namn]! ☺ Jag tänkte att vi skulle prata om din senaste bilkörning.	Hej [namn]
Registrerad fortkörning	Jag märkte att du körde över hastighets-begränsningen under din senaste bilkörning. Du körde 12 km/h för fort i ett tätbebyggt område.	Jag märkte att det gick lite väl fort. (emoji) Det är viktigt att hålla sig inom hastighetsbegränsningen, särskilt i ett tätbebyggt område! Du hade väl inte velat att andra körde för fort där du bor. (emoji)	Jag registrerade att du körde 62 km/h på Sveaholmsgatan som har hastighets-begränsningen 50km/h.
Fråga om orsak	Hur kommer det sig att du överskred hastighets-begränsningen?	Vad var egentligen anledningen till att du körde för fort om du tänker efter riktigt noga?	Varför överskred du hastighets-begränsningen?
Svar om orsak	Hela dagen har varit stressig… Sen höll jag på att glömma min inbokade tandläkartid och det blev knappt om tid för att hinna dit.		
Följdfråga påverkan av orsak	Okej, så kan det bli ibland. Men hur tror du det hade påverkat dig om du hade missat din tandläkartid?	Åh, jag förstår att det har varit en stressande dag för dig. (emoji) Men om du tänker att du hade missat din tandläkartid. Vad är det värsta som då hade kunnat hända menar du?	Hur hade det påverkat dig om du hade missat din tandläkartid?

Svar om påverkan	Det hade tagit extra kraft och tid om jag hade behövt göra en ombokning.		
Bemötande	Trots att det hade krävts ombokning är det viktigast att hitta ett lugn och följa trafikreglerna för att inte sätta dig själv eller andra i fara.	Att boka en ny tid kan ju kännas omständigt, det förstår jag. Men det viktigaste är ju att vara lugn och följa trafikreglerna för att inte sätta dig själv eller andra i fara. (emoji)	Trots risk för ombokning bör trafikreglerna följas.
Info om omgivningen vid fortkörningen	I det tätbebyggda området där du överskred hastighets-begränsningen finns det mycket fotgängare och cyklister som passerar. Nära intill finns det dessutom en grundskola och förskoleverksamhet. Med tanke på detta behöver man som bilist vara uppmärksam!	Där du körde för fort finns det mycket som händer. Såklart är det fler bilar i farten under rusning men det är också många fotgängare och cyklister där. Sen finns det ju en grundskola i närheten och även förskoleverksamhet. Många barn finns alltså i trakterna och det gäller att vara uppmärksam!	Sveaholmsgatan är en lättraffikerad väg som passeras av många bilister och fotgängare under rusningstimmarna. Två gator bort finns en grundskola och förskoleverksamhet. Var därför uppmärksam.
Fråga om möjliga risker	Vilka risker tror du ditt körande hade kunnat leda till i ett tätbebyggt område som detta?	Fundera en stund och tänkt ut vilka risker som ditt körande hade kunnat leda till. Kan du nämna några du kommer på?	Vilka risker hade ditt körande kunnat leda till?
Svar på risker	Ehm, några risker skulle vara att köra på någon, störa omgivningen eller att få böter.		
Feedback	Jag ser att du förstår att detta är ett riskfyllt beteende som kan leda till allvarliga konsekvenser. Även krockar med andra bilar är en risk att ha i åtanke.	Bra jobbat! (emoji) Som du säger finns det helt klart en del risker med att köra för fort. Och dessa risker är inte att ta lätt på, det kan ju handla om allvarliga olyckor! En annan risk hade varit att	Det stämmer. Tänk på att en ytterligare risk är att kollidera med andra bilar.

		krocka med andra bilar längst vägen.	
Fråga uppskattning om fortkörning	Hur ofta tror du uppskattningsvis att du överskrider hastighets-begränsningen?	Om du skulle gissa hur ofta det blir att du kör för fort. Hur ofta skulle det vara?	Hur ofta överskrider du hastighets-begränsningen?
Svar om uppskattning	Det händer nog med jämna mellanrum. Det är lätt att råka köra 10km/h för fort för att tjäna in lite tid.		
Bemötande	Detta är något vi ska försöka förbättra. Det är endast sekunder eller någon minut du skulle tjäna in vid fortkörning, vilket inte är mycket. Samtidigt skulle exempelvis din stoppsträcka bli dubbelt så lång vid 50km/h jämfört med 30km/h. Hastigheten är alltså avgörande för att du ska hinna stanna för en ouppmärksammad fotgängare.	Jag fattar! Men vi ska nog kunna se till så att du bättrar dig. (emoji) Du tjänar faktiskt ingenting på fortkörning. Har du istället tänkt på att din fortkörning kan vara avgörande om du hade hunnit stanna din bil för en ouppmärksammad fotgängare som korsar din väg? Som du förstår så är det superviktigt att bilister kör enligt hastigheterna.	Okej. Dock är tidsvinsten inte stor. En hastighetsökning från 50km/h till 60km/h på en 10km lång sträcka leder endast till en tidsvinst på 2 minuter. Dessa 10km/h kan vara avgörande för att undvika olyckor. Uträkningar visar att stoppsträckan vid en hastighet på 30 km/h är 13m och vid 50km/h ökar sträckan till 26m. Detta skulle vara direkt avgörande om du hade hunnit stanna för en ouppmärksammad fotgängare eller inte.
Fråga om förändring	Vad tror du att du skulle behöva förändra för att börja köra inom hastighets-begränsningen?	Men vad tror du att du skulle behöva förändra för att börja hålla dig till hastigheten?	Vad hade behövts för att du skulle börja köra inom hastighets-begränsningen?
Svar om förändring	Låt mig tänka! Jag hade nog behövt planera mina körningar bättre.		

Bemötande och förslag	Det låter som att planering är en bra utgångpunkt för dig att tänka på. Här har du ett par tips: - Börja åka lite tidigare än planerat för att undvika eventuella förseningar vid oväntade händelser. - Testa Google Maps för att estimera tiden för din bilresa. - Ta hänsyn till tid för parkering. - Var medveten om ditt schema för dagen. -	Det låter som en superbra idé för att du ska börja hålla dig till hastigheten. Som hjälp på vägen kan du få några tips av mig! Ett tips vore att åka lite tidigare än du tänker dig för att ha marginal om något oväntat skulle hända. Ett annat tips är att Google Maps kan vara hjälpsam för att se hur lång tid en sträcka tar att köra. ☺	Att planera kan vara ett tillvägagångssätt. Det viktigaste då är följande: - Estimera din körsträcka med marginal. - Använd estimerings-verktyg som Google Maps. - Tänk på tid att parkera. - Håll koll på kalendern.
Fråga om det känns rimligt	Vad tror du om att fokusera på att planera dina bilresor bättre de kommande två veckorna?	Jag tycker att vi bestämmer att du ska tänka på att planera dina bilresor bättre! (emoji) Vi skulle kunna testa att du aktivt försöker bättra dig under de kommande två veckorna och sedan utvärderar vi hur det har gått. Låter det som en bra ide?	De kommande två veckorna vill jag att du följer mina tips och blir bättre på att planera. Okej?
Accepterande svar	Jag testar det!		
Avrundning med uppmaning	Då säger vi så. Hör av dig till mig om du har funderingar.	Då säger vi så! Tänk på att jag alltid finns här om du har funderingar eller behöver mer råd. (emoji)	Gör så. Du vet vart jag finns.

Avsked	Kör försiktigt så hörs vi snart igen!	Förresten, glöm inte att köra försiktigt! Vi hörs snart igen ☺	Kör försiktigt, hej då!
Avsked	Det ska jag. Hej då! ☺		
Slutför dialog	Hej då [namn]☺	Hej då [namn]☺	-

10.7 Appendix 7 – Scenario on speeding for user tests in iteration two

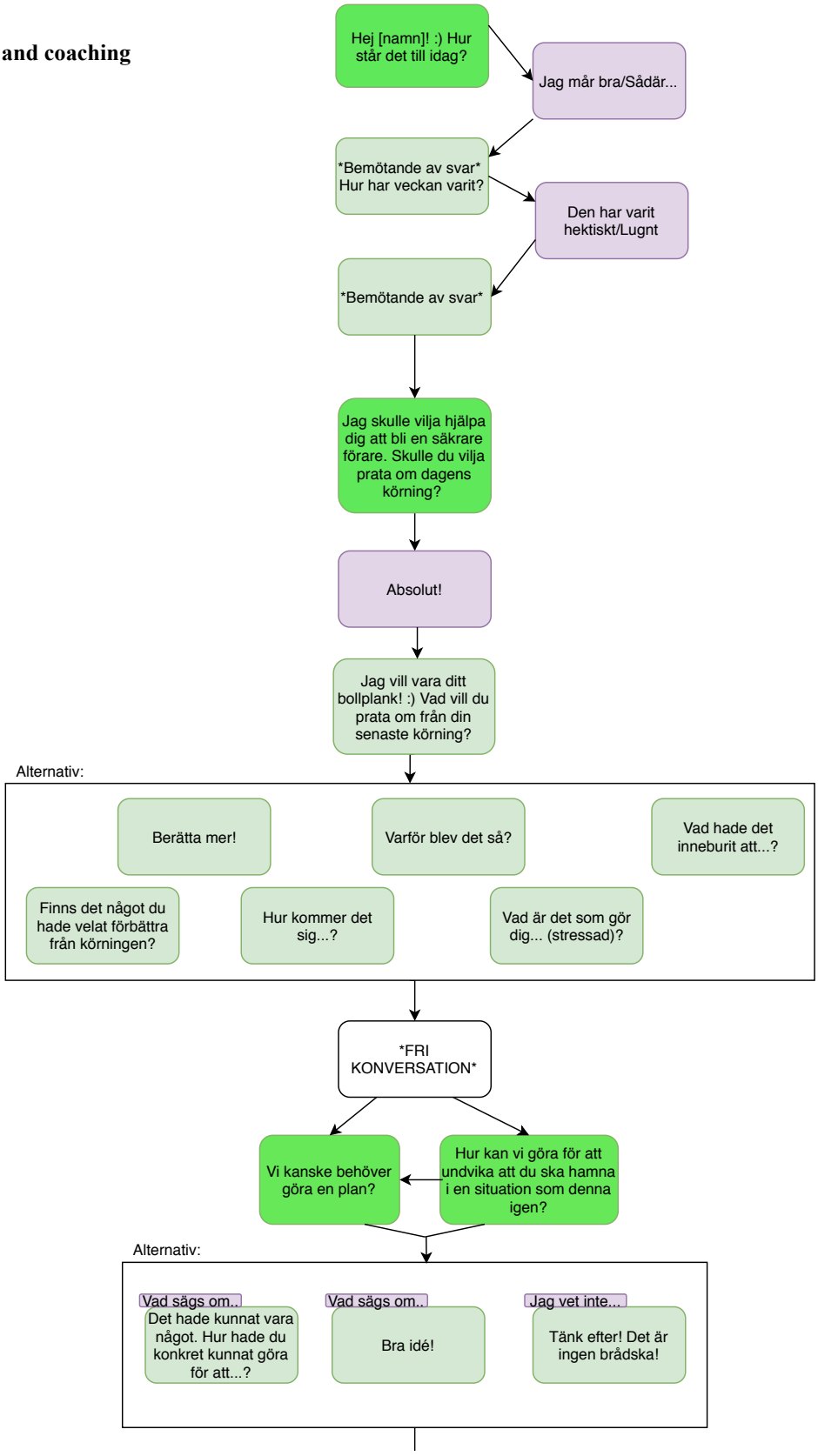
Scenario

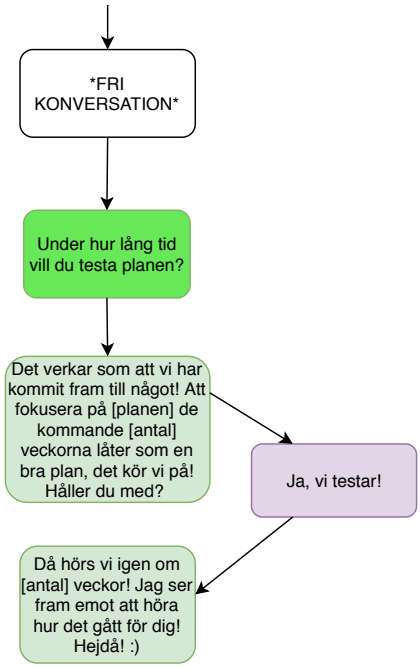
Väckarklockan ringer och det är dags för en ny arbetsdag. Du vaknar upp efter att ha snoozat ett antal gånger och kliver upp sent. Du känner dig trött från gårdagen och vill inget annat än att sova vidare. När du väl har tagit dig upp ur sängen, tittar du på klockan och inser att det endast är 15 minuter kvar tills att morgonens viktiga möte börjar. Du får det stressigt och tar dig snabbt ut till bilen och kör iväg. Du märker att tiden är knapp och ökar därför hastigheten lite mer än du borde. Tillslut svänger du in på parkeringen och springer upp till kontoret för att starta din arbetsdag, precis i tid till mötet.

På eftermiddagen vibrerar din mobil, det är DriveSafe-appen som skickar en notis om att följa upp din senaste körning. Chatboten Safetybot vill ha en dialog med dig när du har några minuter över för att hjälpa dig bli en säkrare förare.

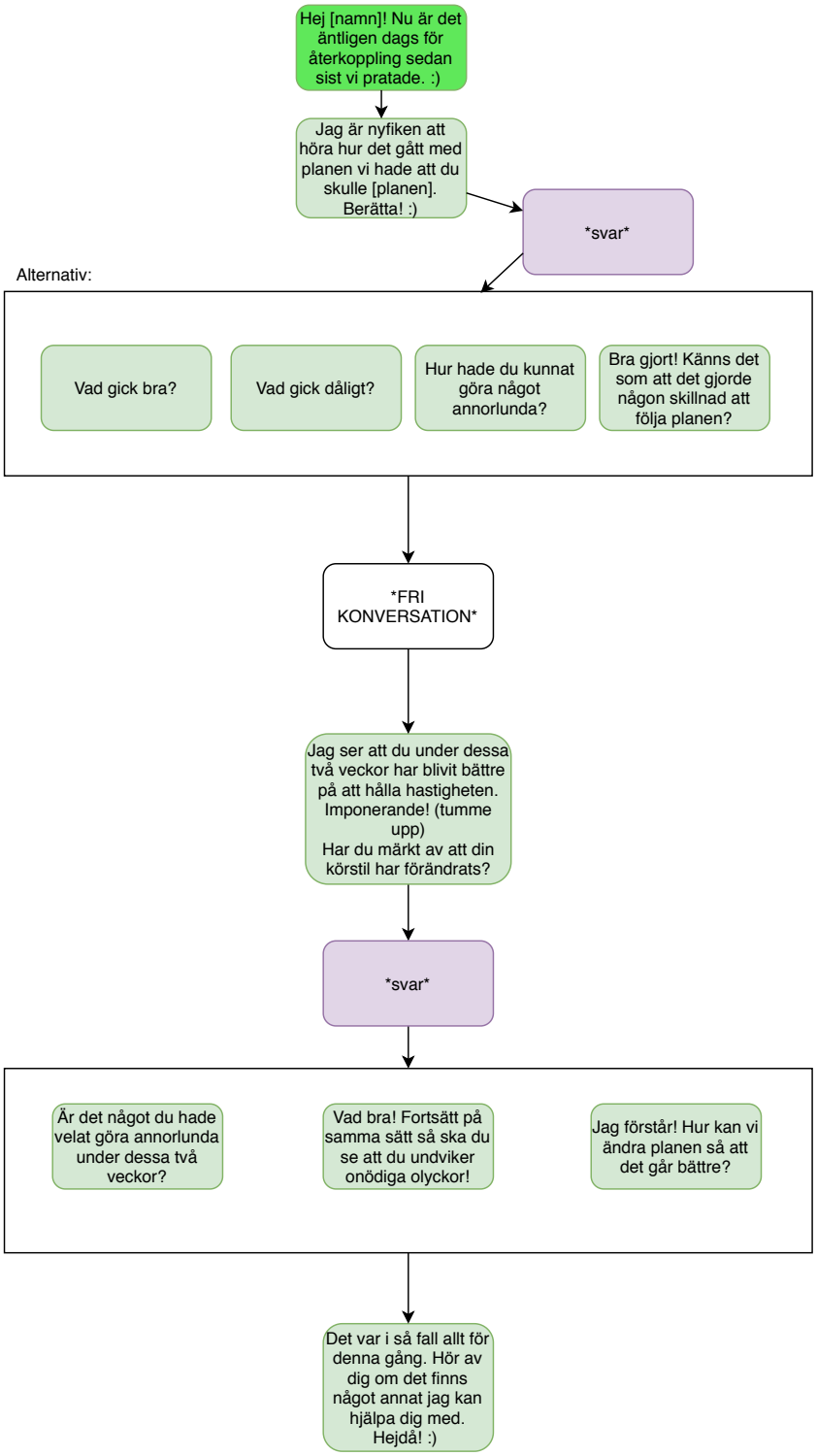
10.8 Appendix 8 – Conversations for version one of the chatbot for iteration two

Part One
Guideing and coaching


Hej [namn]! :) Hur står det till idag?
Jag mår bra/Sådär...
Bemötande av svar Hur har veckan varit?
Den har varit hektiskt/Lugnt
Bemötande av svar
Jag skulle vilja hjälpa dig att bli en säkrare förare. Skulle du vilja prata om dagens körning?
Absolut!
Jag vill vara ditt bollplank! :) Vad vill du prata om från din senaste körning?
Alternativ:
Berätta mer!
Varför blev det så?
Vad hade det inneburit att...?
Finns det något du hade velat förbättra från körningen?
Hur kommer det sig...?
Vad är det som gör dig... (stressad)?
FRI KONVERSATION
Vi kanske behöver göra en plan?
Hur kan vi göra för att undvika att du ska hamna i en situation som denna igen?
Alternativ:
Vad sägs om..
Det hade kunnat vara något. Hur hade du konkret kunnat göra för att...?
Vad sägs om..
Bra idé!
Jag vet inte...
Tänk efter! Det är ingen brådska!

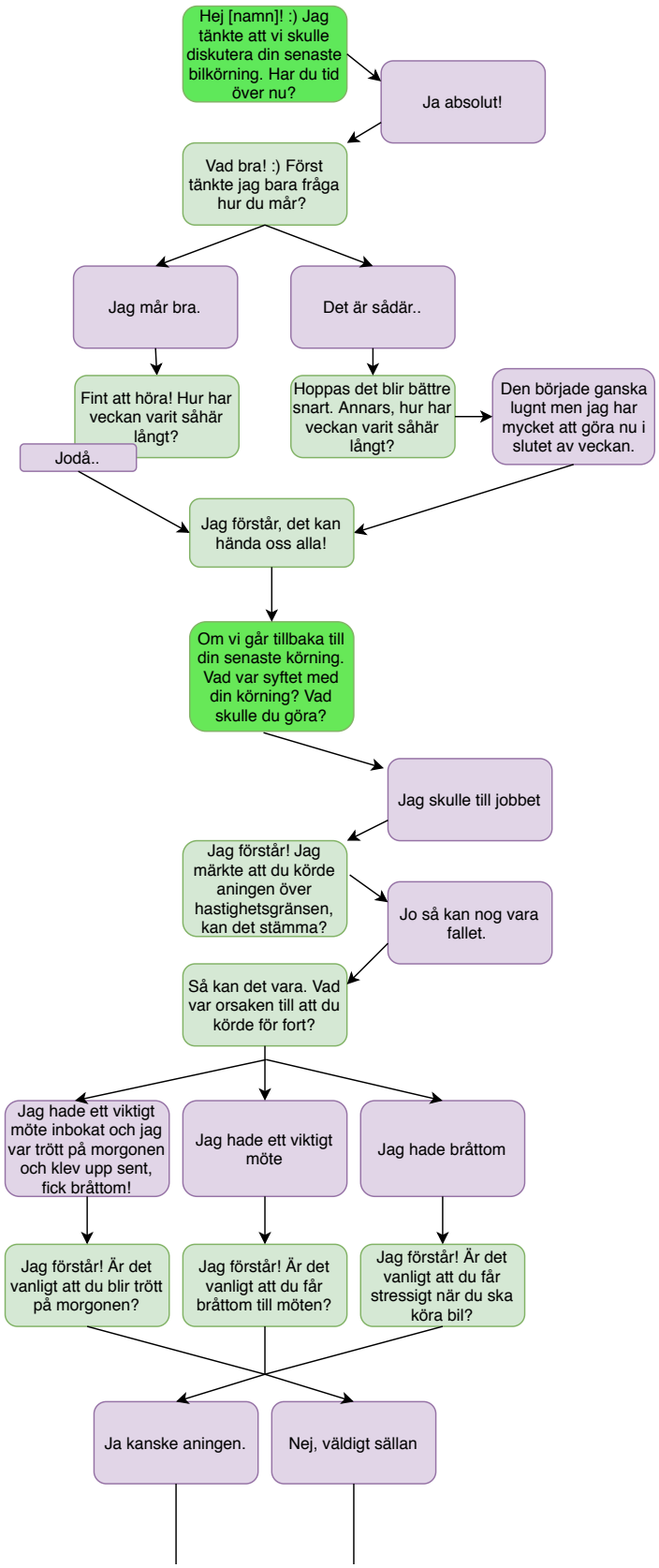

FRI KONVERSATION
Under hur lång tid vill du testa planen?
Det verkar som att vi har kommit fram till något! Att fokusera på [planen] de kommande [antal] veckorna låter som en bra plan, det kör vi på! Håller du med?
Ja, vi testar!
Då hörs vi igen om [antal] veckor! Jag ser fram emot att höra hur det gått för dig! Hejdå! :)

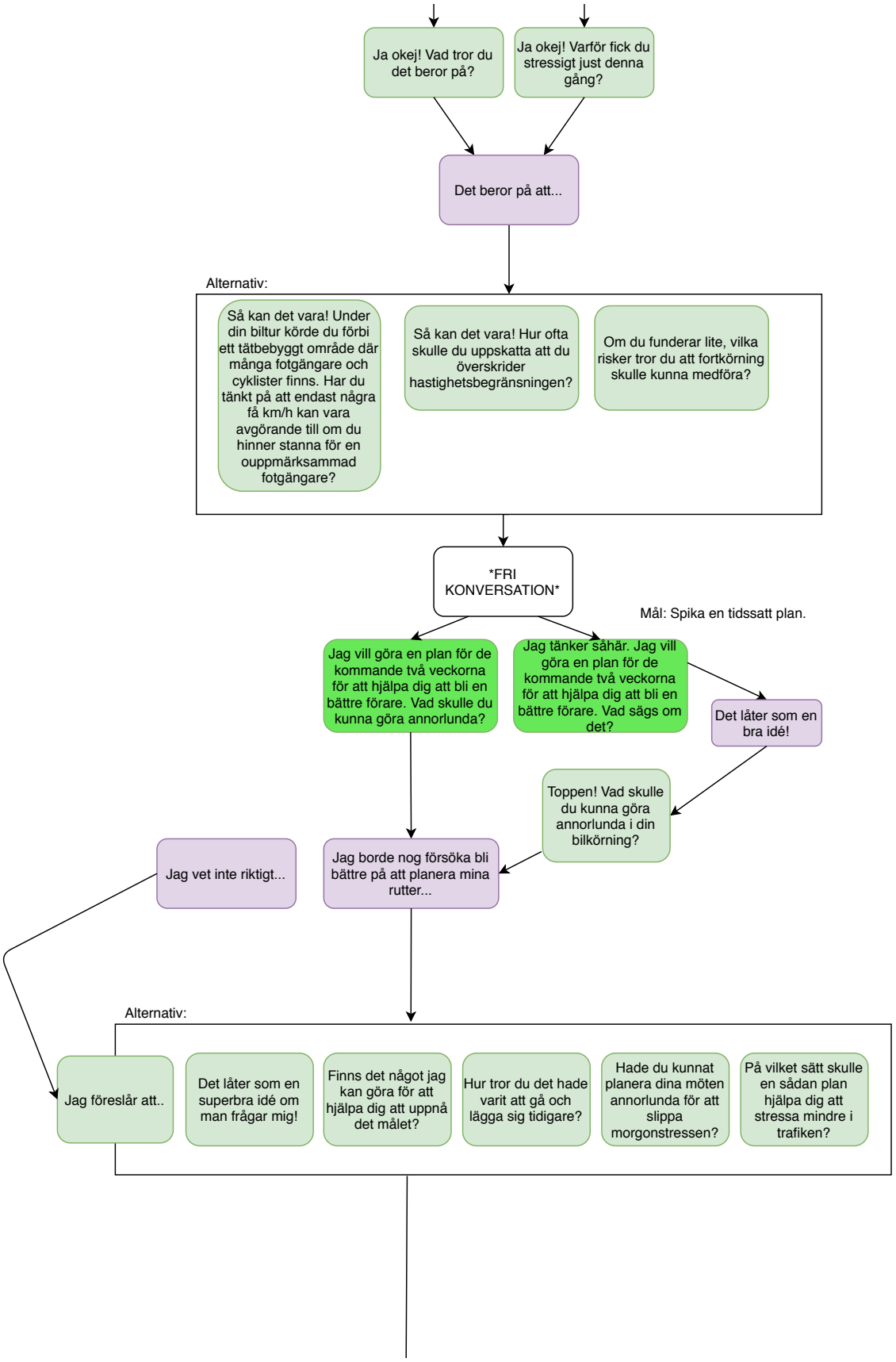
Part Two
Follow-Up

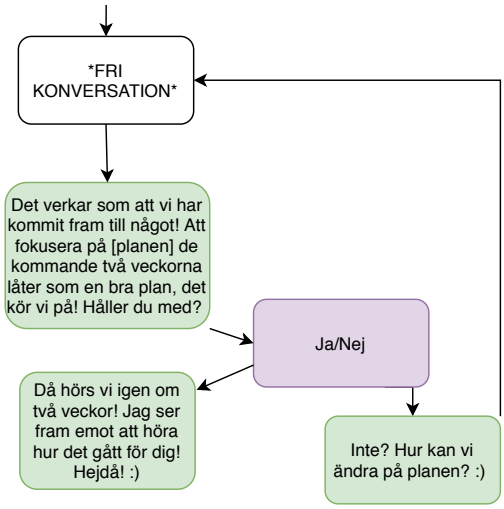

Hej [namn]! Nu är det äntligen dags för återkoppling sedan sist vi pratade. :)
Jag är nyfiken att höra hur det gått med planen vi hade att du skulle [planen]. Berätta! :)
svar
Alternativ:
Vad gick bra?
Vad gick dåligt?
Hur hade du kunnat göra något annorlunda?
Bra gjort! Känns det som att det gjorde någon skillnad att följa planen?
FRI KONVERSATION
Jag ser att du under dessa två veckor har blivit bättre på att hålla hastigheten. Imponerande! (tumme upp)
Har du märkt av att din körstil har förändrats?
svar
Är det något du hade velat göra annorlunda under dessa två veckor?
Vad bra! Fortsätt på samma sätt så ska du se att du undviker onödiga olyckor!
Jag förstår! Hur kan vi ändra planen så att det går bättre?
Det var i så fall allt för denna gång. Hör av dig om det finns något annat jag kan hjälpa dig med. Hejdå! :)

10.9 Appendix 9 – Conversations for version two of the chatbot for iteration two

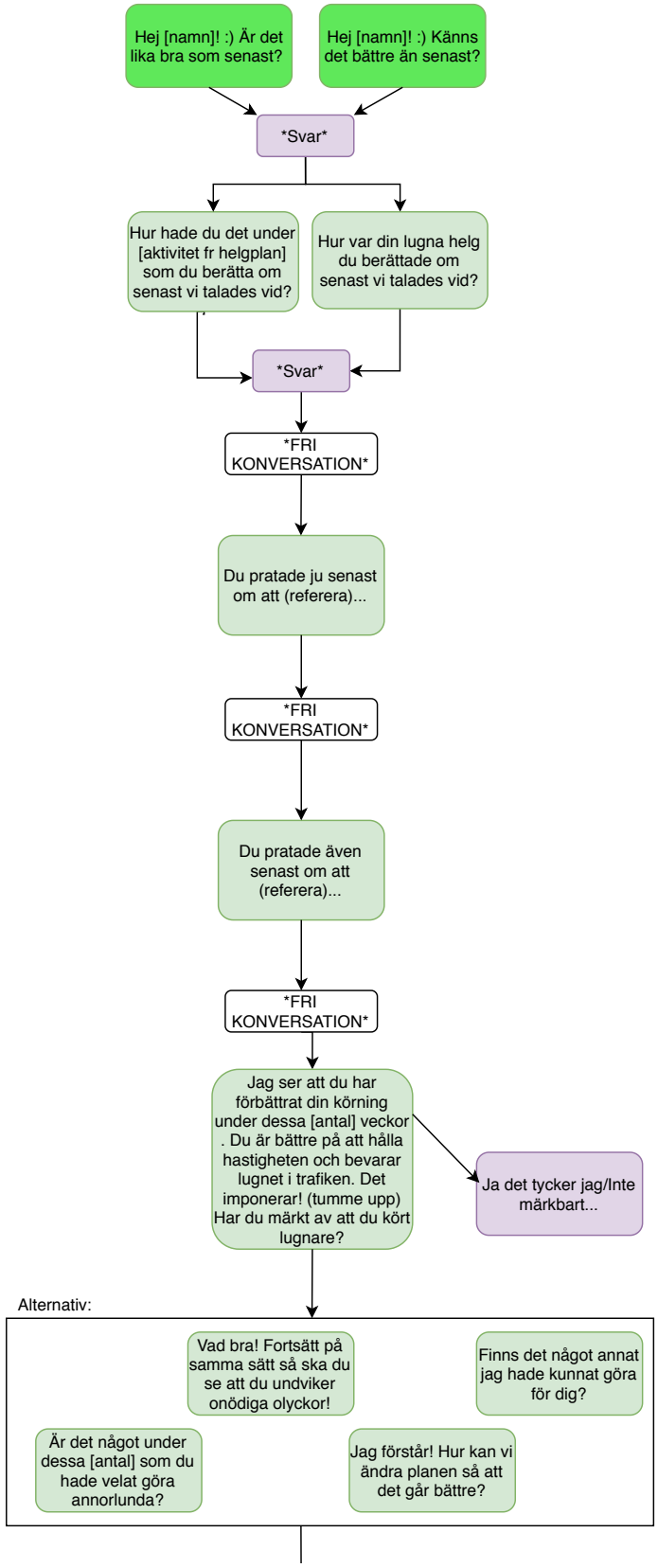
Part One:
Guiding and Coaching

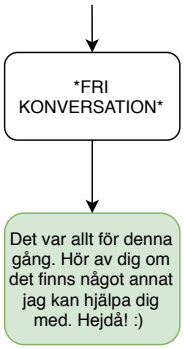

Hej [namn]! :) Jag tänkte att vi skulle diskutera din senaste bilkörning. Har du tid över nu?
Ja absolut!
Vad bra! :) Först tänkte jag bara fråga hur du mår?
Jag mår bra.
Det är sådär..
Fint att höra! Hur har veckan varit såhär långt?
Jodå..
Hoppas det blir bättre snart. Annars, hur har veckan varit såhär långt?
Den började ganska lugnt men jag har mycket att göra nu i slutet av veckan.
Jag förstår, det kan hända oss alla!
Om vi går tillbaka till din senaste körning. Vad var syftet med din körning? Vad skulle du göra?
Jag skulle till jobbet
Jag förstår! Jag märkte att du körde aningen över hastighetsgränsen, kan det stämma?
Jo så kan nog vara fallet.
Så kan det vara. Vad var orsaken till att du körde för fort?
Jag hade ett viktigt möte inbokat och jag var trött på morgonen och klev upp sent, fick bråttom!
Jag hade ett viktigt möte
Jag hade bråttom
Jag förstår! Är det vanligt att du blir trött på morgonen?
Jag förstår! Är det vanligt att du får bråttom till möten?
Jag förstår! Är det vanligt att du får stressigt när du ska köra bil?
Ja kanske aningen.
Nej, väldigt sällan


Ja okej! Vad tror du det beror på?
Ja okej! Varför fick du stressigt just denna gång?
Det beror på att...
Alternativ:
Så kan det vara! Under din biltur körde du förbi ett tätbebyggt område där många fotgängare och cyklister finns. Har du tänkt på att endast några få km/h kan vara avgörande till om du hinner stanna för en ouppmärksammad fotgängare?
Så kan det vara! Hur ofta skulle du uppskatta att du överskrider hastighetsbegränsningen?
Om du funderar lite, vilka risker tror du att fortkörning skulle kunna medföra?
FRI KONVERSATION
Mål: Spika en tidssatt plan.
Jag vill göra en plan för de kommande två veckorna för att hjälpa dig att bli en bättre förare. Vad skulle du kunna göra annorlunda?
Jag tänker såhär. Jag vill göra en plan för de kommande två veckorna för att hjälpa dig att bli en bättre förare. Vad sägs om det?
Det låter som en bra idé!
Toppen! Vad skulle du kunna göra annorlunda i din bilkörning?
Jag vet inte riktigt...
Jag borde nog försöka bli bättre på att planera mina rutter...
Alternativ:
Jag föreslår att..
Det låter som en superbra idé om man frågar mig!
Finns det något jag kan göra för att hjälpa dig att uppnå det målet?
Hur tror du det hade varit att gå och lägga sig tidigare?
Hade du kunnat planera dina möten annorlunda för att slippa morgonstressen?
På vilket sätt skulle en sådan plan hjälpa dig att stressa mindre i trafiken?


FRI KONVERSATION
Det verkar som att vi har kommit fram till något! Att fokusera på [planen] de kommande två veckorna låter som en bra plan, det kör vi på! Håller du med?
Ja/Nej
Då hörs vi igen om två veckor! Jag ser fram emot att höra hur det gått för dig! Hejdå! :)
Inte? Hur kan vi ändra på planen? :)

Part Two
Follow-Up


Hej [namn]! :) Är det lika bra som senast?
Hej [namn]! :) Känns det bättre än senast?
Svar
Hur hade du det under [aktivitet fr helgplan] som du berätta om senast vi talades vid?
Hur var din lugna helg du berättade om senast vi talades vid?
Svar
FRI KONVERSATION
Du pratade ju senast om att (referera)...
FRI KONVERSATION
Du pratade även senast om att (referera)...
FRI KONVERSATION
Jag ser att du har förbättrat din körning under dessa [antal] veckor . Du är bättre på att hålla hastigheten och bevarar lugnet i trafiken. Det imponerar! (tumme upp) Har du märkt av att du kört lugnare?
Ja det tycker jag/Inte märkbart...
Alternativ:
Vad bra! Fortsätt på samma sätt så ska du se att du undviker onödiga olyckor!
Finns det något annat jag hade kunnat göra för dig?
Är det något under dessa [antal] som du hade velat göra annorlunda?
Jag förstår! Hur kan vi ändra planen så att det går bättre?


*FRI
KONVERSATION*
Det var allt för denna gång. Hör av dig om det finns något annat jag kan hjälpa dig med. Hejdå! :)

10.10 Appendix 10 – Translations of extracts from conversations during user

Image 3

Safetybot:	What risks could your driving have led to in an urban area like this?
User:	Ehm… Some risks could be to run someone over, disrupt the neighborhood or get a ticket.
Safetybot:	I can see that you understand that this risky driving could lead to serious consequences. Even collisions with other cars is a risk that you should have in mind.
User:	It happens once in a while. Driving 10km/h too fast happens very easily when in need of extra time.

Image 4

Safetybot:	It sounds like planning is a good starting-point for you. Here are some tips: • Start driving in time to avoid delays due to unexpected events. • Try Google Maps to estimate the time required for your trip • Make sure to have time for parking • Be aware of your daily schedule

Image 5

Safetybot:	Let's decide that you should focus on becoming better at planning your trips ☺ We could try focusing on this for the two upcoming weeks and then evaluate your progress. Does that sound like a good idea?
User:	I will try it!
Safetybot:	Then it's decided! Remember that I'm here if you have questions or need more advice along the way. ☺ By the way, don't forget to drive safe! I'll talk to you soon ☺ Goodbye xxx!

Image 6

Safetybot:	That's good! Use me as your sounding board! Tell me about your last driving ☺
User:	I was oversleeping and felt quite stressed, so I probably drove faster than what I should have.
Safetybot:	I understand. Is it common that you become stressed while driving?
User:	No, it happens very rarely, only if I'm in a big rush to something important.

tests

Image 7

Safetybot:	That's nice to hear! Let us go back to your last driving. What was the purpose with it? What were you going to do?
User:	I was going to work. Unfortunately, I drove a bit fast since I was late.
Safetybot:	I see! I noticed that you drove slightly over the speed limit. Is it common that you rush to work?
User:	Yes, sadly enough, it happens quite often that I oversleep or having a longer breakfast than I should.
Safetybot:	Okay, how often would you asses that you go over speed limit?
User:	Perhaps some days a week.

Image 8

Safetybot:	Hi again xxx! ☺ How's the renovation going and foremost your driving?
User:	The master bedroom is finished and the driving has worked just fine, been waking up right on time since the alarm sounds like a fire alarm ☺
Safetybot:	Awesome xxx! And how's everything at work, feeling busy this week as well?
User:	Well it's alright, just as usual. How about you?
Safetybot:	I understand! Nice of you to ask, I'm feeling excellent ☺ Last time you told me that you needed to become better at keeping the speed down. How did that turn out for you this week?
User:	Good, I think. I assume that you have seen my driving, did it look good?

Image 9

Safetybot:	Hello xxx! It's time for some feedback since we last spoke. ☺ I'm curious to hear about how things have gone for you regarding to plan your driving better. Tell me! ☺
User:	Well now when I know the consequences, I plan my mornings better! And try to be extra cautious when I drive close to pedestrians and also looking twice nearby crosswalks. By planning my mornings better, I can think of all these things whilst making it to work in time.
Safetybot:	Well done! Do you believe it made any difference by focusing on this?
User:	Yes, I believe so!

Image 10

User:	That's good! Do you have any suggestions?
Safetybot:	What do you think about actively maintain a slower pace while driving?
User:	As a general rule that's always preferable. But to be late to important meetings could risk my job and my income. And as long as I drive structured, I don't see a problem with the speed.
Safetybot:	I understand! Would it be better if I send you notifications and reminders before you start driving?

Image 11

Safetybot:	That sounds like a step in the right direction! To plan your driving could help you to stay within the speed limit. How can we do this concretely in order for you to avoid getting into a similar situation again?
User:	Perhaps to remind me the day before that I have an important meeting in the morning and that it's crucial to wake up in time, so I don't need to rush to work. Alternatively, to have coaching in the car that calms me down or give me reminders about my stressful driving style.
Safetybot:	That's good ideas xxx. You know yourself best after all! ☺ I can surely help you by sending out reminders the day before! Coaching in the car is not possible at the moment, but perhaps in the future! Is there anything else you can do on your own to not end up in similar situations?
User:	Plan my mornings better and to wake up in time!
Safetybot:	That's true! What do you say about trying these ideas and see how that feels for some time? ☺